THE MONTHLY

Review

Official Organ of the American Electroplaters' Society
A Society for the Advancement of the Science of Electroplating

JANUARY • • • 1945

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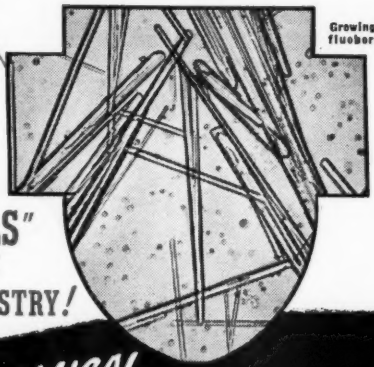

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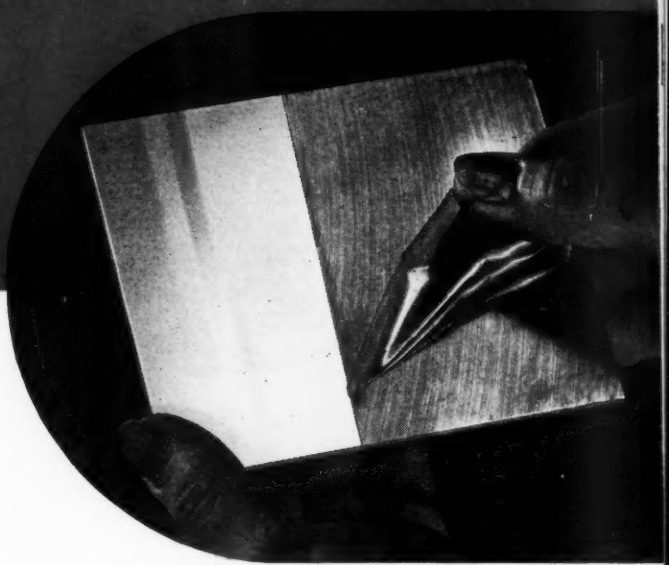

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In preparing the following over-all chart we have selected the particular grade of Composition most widely used on each operation. However, since there are many variable factors in all finishing jobs, such as sequence of operations, type and speed of buffs and wheels, methods of cleaning, and type and quality of finish required, the COMPLETE STEVENS LINE includes a selection of grades in each class of product, as described elsewhere in this booklet. See INDEX, Page 2. FOR DEBURRING OPERATIONS SEE PAGE 6.

MATERIAL	POLISHING		BUFFING		FINISHING	
	On Set-up Wheels	On Buffs	Hand Buffing	Automatic Machine	*Bright (Mirror)	Semi-bright (Satin, etc.)
Aluminum			#20 Tripoli #70 Tripoli #73 Tripoli	#12 Tr. #2 D. D. #12 Tr.	FC Colg. HL Colg. HL Colg.	M Greaseless F Greaseless
Castings	#2 Tallow #2 Tallow					
Forgings						
Stampings						
Brass		M Greaseless F Greaseless	Reg. #1 Trip. Marvel Trip. Marvel Trip. Plastiout #8 D. D. #20 Trip. Cutmore Tr. #8 D. D. #100 Tr. Plastiout Reg. #1 Tr. #16 Black	#70 Tr. #100 Tr. #472 Colg. #12 Tr. #14 Tr. #408 St.	HL Colg. HL Colg. HL Colg. Plastiolor HL Colg. FC Color #181 White HL Colg. AB Colg.	M Greaseless F Greaseless F Greaseless F Greaseless F Greaseless C Greaseless Tampico Comp. F Greaseless
Castings	#1 Tallow #2 Tallow					
Forgings						
Stampings						
Celluloid						
Copper						
Die Castings	#1 TS & Em. C.	C Greaseless				
Iron						
Leather						
Pewter						
Plastics					Plastiolor #181 White #16 Black	
Soft Types						
Hard Types					White Rose #1023 Chr. HL. #650 Ace Rouge White Rose HL #650 PX Rouge Crocus White Rose Green Flat. #16 Black	#67 Greaseless
Black Types						
Plated Surfaces						
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Chromium						#66 Greaseless #67 Greaseless
Copper						
Gold				FF #13 Lime	FF #14 L.	
Lead						
Nickel						
Silver						
Tin				#29 X White #16 Black	Reg. #1 Tr.	XL Rouge 12 X Rouge	#67 Greaseless #67 Greaseless
Zinc						
Platinum			#12 Trip #3 Trip.	#100 Tr. #100 Tr.		
Rubber (Hard)						
Silverware						
Ni-Silver				#408 St. #403 St. #8 D. D. Reg. #1 Tr.	#400 St. #20 St.	#181 White #29 X White HL Colg. #8 D. D.	M Greaseless F Greaseless
Sterling						
Steel	#1 TS & Em. C. #4 Tallow #4 Tall. & Em. C.	C Greaseless F Greaseless				
Carbon						
Stainless						
White Metal						
Wood						

NOTE: Where a line (——) is drawn through a space, we do not specify any product because the operation is seldom, if ever, performed.
Under the heading "POLISHING" two alternative methods are suggested, either a "set-up" wheel, using either natural emery or artificial abrasive, set-up with glue or with STEVENS ABRASIVE CEMENT, and lubricated with Tallow Composition (many jobs, especially carbon steel or iron, also require Emery Cake or Emery Paste); or, as an alternative, Greaseless Composition applied to a buff or wheel, without lubrication.
*For further recommendations on MIRROR FINISHING, see chart under "Rouge Compounds" Page 11.

This is Page 16 of our Buffing Composition Catalog

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THE MONTHLY

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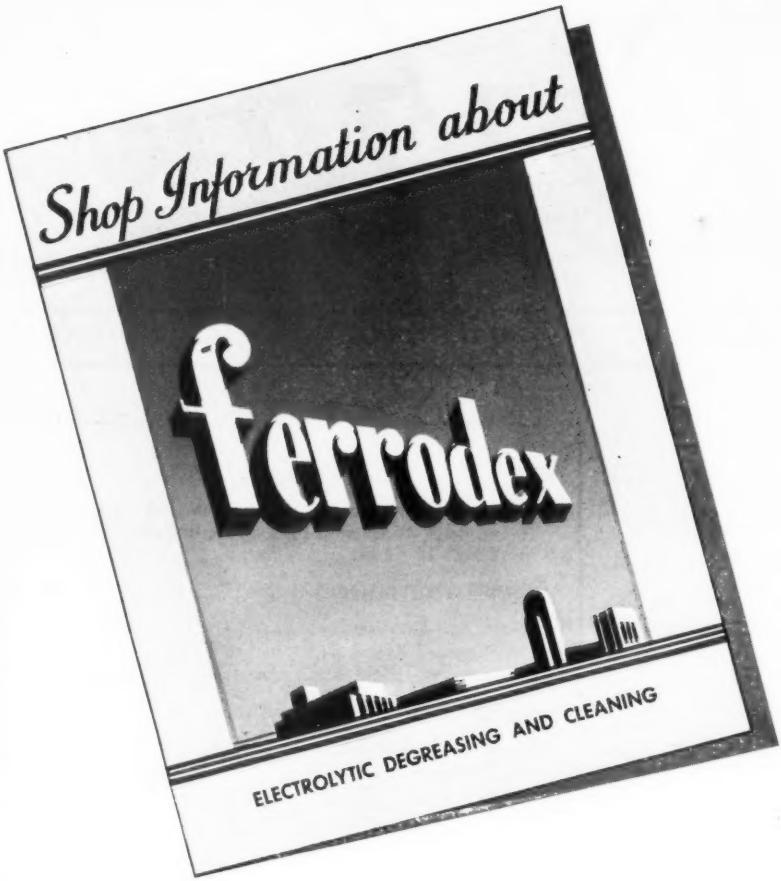

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COLORIMETRIC METHODS AS APPLIED TO THE ANALYSIS OF ELECTROPLATING BATHS

D. Gardiner Foulke, Ph. D.

II. The Determination of Traces of Nickel

RELATIVELY small amounts of nickel can be quantitatively determined gravimetrically as the nickel-dimethylglyoxime complex. Here the nickel content is only 26% of the precipitate, and, although the nickel concentration amounts to only fifty milligrams per liter, a two-hundred milliliter sample will provide a precipitate of forty milligrams—an appreciable mass. However, this method is long and tedious as are all gravimatric methods. Moreover, unless the analyst is experienced, the method may yield inaccurate results.

For the colorimetric determination of nickel[1] the following method gives accurate results with a speed unattainable by any other method.

The method as developed for the analysis of nickel rinses and solutions containing a minimum of interfering ions is as follows:

1. Place a 10 milliliter sample of the unknown in a 100 milliliter volumetric flask (or 25 ml. in a 250 ml. flask) and dilute to the mark.
2. Mix thoroughly, then place a 10 milliliter aliquot of the diluted sample (1 ml. of the original solution) in a one-hundred milliliter volumetric flask containing fifty milliliters of distilled water.
3. To this flask add:
   Five milliliters of saturated bromine water.
   Five milliliters of ammonium hydroxide (1:1), mix.
   Three milliliters of dimethylglyoxime solution (1 gm. dissolved in 100 ml. 50% alcohol).
4. Add distilled water to the one-hundred milliliter mark and mix thoroughly.
5. Transfer to an absorption cell and measure the percent trans-

*Directions for the operation of the electrophotometer were described in the "Monthly Review" for December 1944.

**Distilled water may be used as a blank when pure reagents are used and no colored ions are present.

mittance in an electrophotometer* using a 525-B filter, using distilled water as a blank.**

6. Read the milligrams per liter of nickel from the curve prepared from standard solutions.
7. Should the reading of the electrophotometer be above 30, dilute to two-hundred milliliters and multiply by two or adjust the original dilution.

The graph correlating the milligrams per liter of nickel with the electrophotometer reading is shown in Figure I, while the data employed to obtain this curve are shown in Table I.

Table I
Calibration of Electrophotometer

Milligrams Ni/Liter	*Electrophotometer Reading*
100.4	24.0
50.20	12.4
40.16	9.5
20.08	5.0
10.04	2.7

In Table II are shown the results which may be obtained by this method as applied to various solutions.

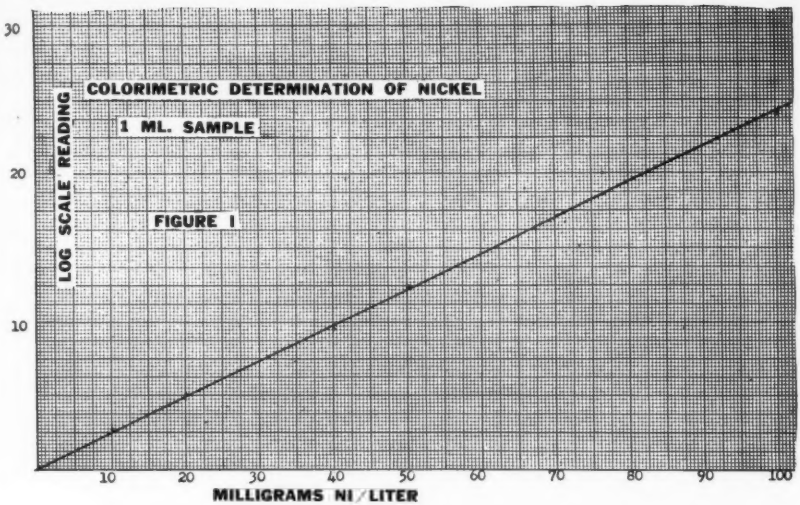
Table II
Colorimetric Nickel Analyses

	Nickel Analysis		
	Colorimetric		*Gravimetric*
Solution	*Reading*	*Mg/L*	*Mg/L*
Acid Leach	12.8	51	50
Nickel Rinse	12.4	49	50
Alkaline Cleaner	1.2	4.9	5

Only a few metals interfere with this method. Ferric iron does not interfere except that a precipitate forms. However, the addition of citric acid in step three above eliminates this difficulty.

To show that this method is generally applicable analyses were carried out on various electroplating baths as shown in Table III. A slight modification was necessary in both the chromic acid and copper baths.

The color of the chromic acid bath was found to interfere with the determination as described above. Two methods of separation were possible, the removal of the chromic acid or the separation of the nickel by some means. Precipitation of the chromate as lead chromate in acetic acid and the elimination of excess lead by the addition of ammonium hydroxide in the presence of ammonium salts was found to be a satisfac-



tory method. However, this method of separation was rather long and involved. A simple chloroform extraction of the nickel-dimethylglyoxime precipitate[2] was found highly satisfactory. The 10 millimeter aliquot of the diluted sample (Step #2) was placed in a 100 ml. Squibb separatory funnel, made slightly alkaline with ammonium hydroxide, and 5 milliliters of 1% dimethylglyoxime solution was added. Five milliliters of chloroform were added and the mixture was shaken for half a minute. After the two layers separated the chloroform was drawn off into a second separatory funnel containing ten milliliters of 1:50 ammonium hydroxide. The extracts were shaken with the 1:50 ammonia solution, allowed to settle, and the chloroform extract was then drawn off into a third separatory funnel containing 10 milliliters of 0.5 N hydrochloric acid. After shaking the chloroform layer was drawn off into a fourth separatory funnel containing another 10 ml. of 0.5 N hydrochloric acid, and shaken. Finally, the two hydrochloric acid solutions were joined in a 100 ml. volumetric flask, bromine water was added and the analysis for nickel carried out as usual.

The intense blue color of the copper-ammonia complex could not be entirely filtered out, so to the ten milliliter aliquot was added five milliliters of concentrated sulfuric acid and several milliliters of nitric acid (in the hood), to decompose the cyanide. The nitric acid was then fumed out and twice as much water as acid remaining in the flask was added followed by precipitation of the copper sulfide with hydrogen sulfide. The sulfide was filtered out and the hydrogen sulfide boiled from the solution, after which analysis for nickel was carried out in the usual manner.

Table III

The Colorimetric Determination of Nickel

Type Bath	*Nickel Present in Bath, Mg./L.*	*Nickel Added Mg./L.*	*Nickel Found* Reading	*Mg./L*
Cadmium Cyanide	0	50	12.5	50
		100*	12.3	99
Chromic	0	50	12.13	49
		100*	12.13	98
Copper Cyanide	30 mg./l.	50	19.5	80.0
		100	32.1	133.0
Zinc Cyanide	0	50	12.2	49.5
		100*	12.4	100

*First dilution was 10 ml. to 200 ml.

This colorimetric method for the determination of nickel is generally applicable when ions colorless in ammoniacal solution are present. When colored ions are present the chloroform extraction of the nickelous dimethylglyoxime, are described for the chromic acid bath, can almost invariably be employed. For example, nickel may be separated from cobalt when the latter is present in a ratio of 1000:1 with respect to the nickel concentration. Copper dimethylglyoxime accompanies the nickel compound into the chloroform layer, but can usually be removed by the ammonium hydroxide wash. However, when the copper-nickel ratio is as great as is the case in the acid copper or copper cyanide bath it is wiser to remove the copper by sulfide precipitation as described above. Manganese has been reported[3] to interfere when the chloroform extraction method is employed, although the simple method, without benefit of the chloroform extraction, is widely used in steel analysis.[4] Here again the copper should be removed if it exceeds nickel in amount.

This method for the determination of nickel is rapid, accurate and neat. Moreover, it is quite inexpensive even though the chloroform extraction is employed, since the solvent may be recovered by distillation.

References

1. Colorimetric Methods of Analysis, Foster D. Snell and Cornelia T. Snell, D. Van Nostrand Co., p. 314 (1937).
2. E. B. Sandell and R. W. Perlech, Ind. Eng. Chem., Anal. Ed. **11** 339 (1939).
3. Colorimetric Determination of Traces of Metals, E. B. Sandell, Interscience Publishers, Inc., p. 339 (1944).
4. W. M. Murry and S. E. Q. Ashley, Ind. Eng. Chem., and Ed., **10** 1 (1938).

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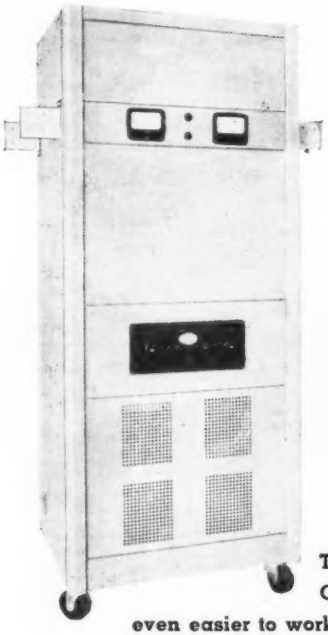

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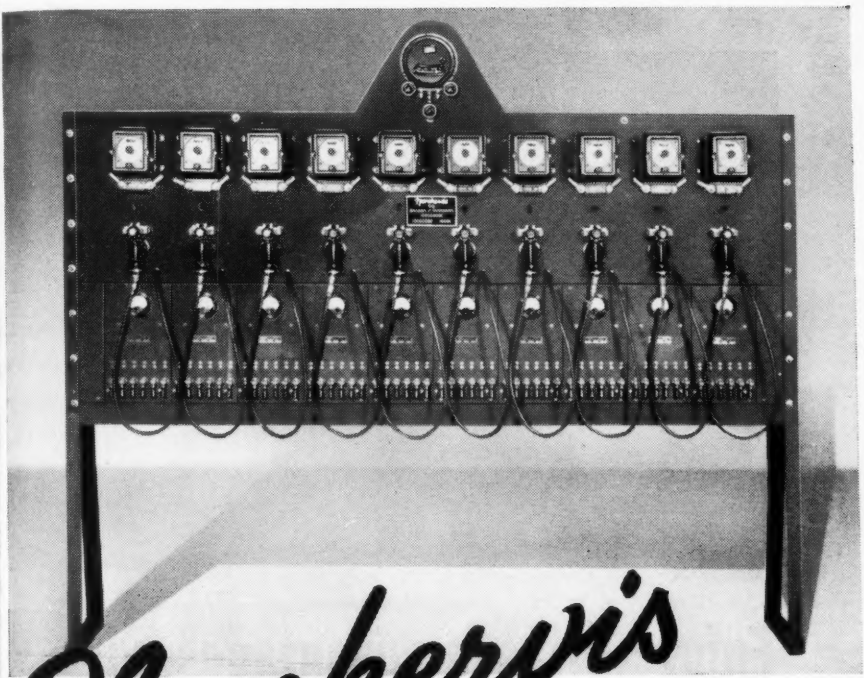

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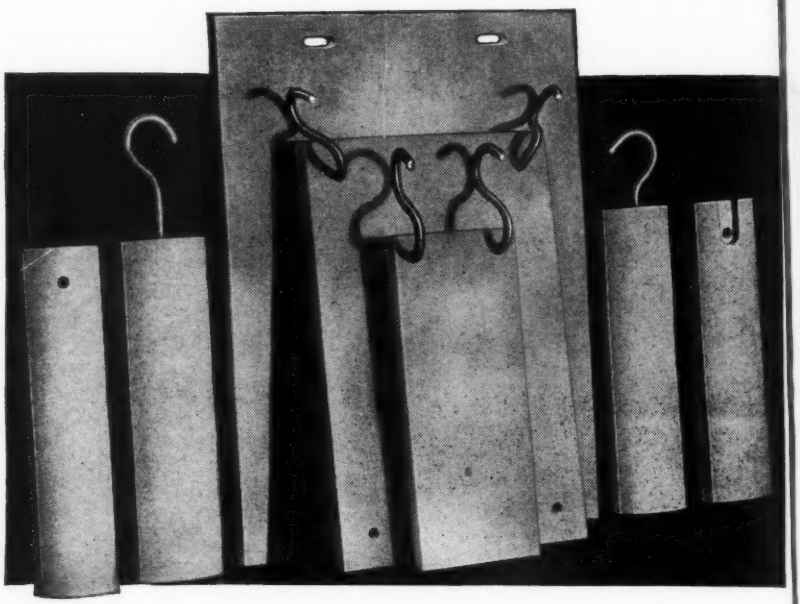

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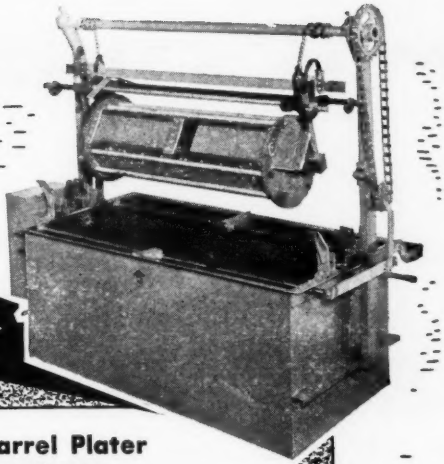

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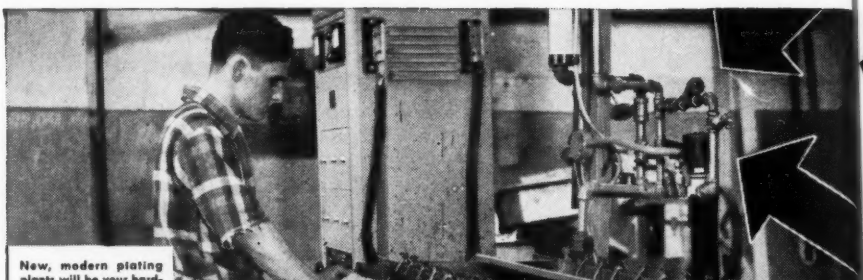

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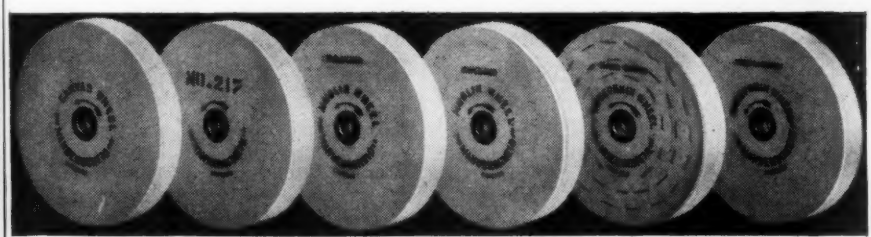

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THE FUNDAMENTALS OF CHEMISTRY FOR ELECTROPLATERS

PART XV THE PREPARATION AND PROPERTIES OF SALTS

Samuel Glasstone, D. Sc., Ph. D.

Definition of Salts

FROM the point of view of the electroplater the substances known as "salts" are of considerable importance. Many of the materials employed in making up plating solutions, as, for example, the various cyanides, copper and nickel sulfates, ammonium chloride, etc., are salts. As explained in earlier articles (e.g., Part XIII, *Monthly Review*, November 1944), a salt, together with water, results from the mutual neutralization of an acid and a base. In the neutralization process the characteristic properties of both acid and base are lost, and the resulting salt has an entirely different nature. An outstanding example is provided by the salt ammonium chloride; this is a white solid obtained by the neutralization of ammonia gas by hydrochloric acid, either in the form of gas or in solution. The most familiar of all salts is sodium chloride, or common table salt. This is, however, merely just one of a large group of compounds, as explained in Part XI (September 1944). As stated there, the term "salt" is applied to any substance which results from the substitution of the hydrogen atom (or atoms) of an acid by an atom (or atoms) of a metal.

Preparation of Salts: Direct Combination

Many different methods have been used for the preparation of salts; the best procedure to be used in any particular case depends on the salt required, and on the available materials. The most obvious method for the preparation of certain salts is the direct combination of the elements. For example, suppose it is required to prepare copper (cupric) chloride, $CuCl_2$; the constituent elements are copper (Cu) and chlorine (Cl), and if metallic copper in a suitable form is heated in a current of chlorine gas, cupric chloride is formed according to the reaction

$$Cu + Cl_2 = CuCl_2$$

This is not necessarily the best way to make cupric chloride, but it is quite a possible one; however, in some cases direct union of the elements is the most satisfactory way to prepare a particular salt. Incidentally, the method is applicable mainly when the salt contains but two elements, as is the case with chlorides. When there are three or more elements, the direct combination method can rarely be used. It would not be an easy matter, for instance, to make silver cyanide by attempting to combine silver, carbon and nitrogen, of which it is composed.

Salts from Acids

A second type of method for the preparation of salts is based on the fundamental description of a salt as resulting from the replacement of the hydrogen of an acid by a metal. Several methods for performing this replacement are possible, and three may be mentioned. First, by the direct reaction between the metal and the acid; this cannot be done in all cases, but is feasible in many instances. For example, ferrous (iron) sulfate ($FeSO_4$) can be obtained by the action of sulfuric acid solution on metallic iron, viz.,

$$Fe + H_2SO_4 = FeSO_4 + H_2.$$

The hydrogen gas (H_2) is given off, and the salt, ferrous sulfate, remains in the solution from which it can be obtained by evaporating off some of the water. Other salts of metals such as zinc and nickel can be obtained in a similar manner.

Another method for replacing the hydrogen of an acid is the familiar means of neutralization by a base; the latter may be a metallic oxide or hydroxide or ammonia. Nickel sulfate ($NiSO_4$), for example, may be prepared from nickel oxide (NiO) and sulfuric acid solution, viz.,

$$NiO + H_2SO_4 = NiSO_4 + H_2O.$$

The neutralization of an acid by a hydroxide may be illustrated by reference to the formation of calcium chloride ($CaCl_2$) from calcium hydroxide ($Ca(OH)_2$) and hydrochloride acid (HCl), viz.,

$$Ca(OH)_2 + 2HCl = CaCl_2 + 2H_2O.$$

This type of reaction is probably the most general for the preparation of a wide variety of salts.

In place of the basic or hydroxide, salts may be obtained by the action of a metallic carbonate with an acid; here again, the hydrogen of the latter is replaced by the metal (see Part XI, September 1944).

In illustration may be quoted the formation of copper nitrate ($Cu(NO_3)_2$) from copper carbonate ($CuCO_3$) and nitric acid (HNO_3), viz.,

$$CuCO_3 + 2HNO_3 = Cu(NO_3)_2 + H_2O + CO_2.$$

This method, like the preceding one, is of wide applicability.

Insoluble Salts

If a salt is insoluble, or only slightly soluble, in water, it is possible to obtain it in a pure form by a process known as "double decomposition." Suppose, for example, it is required to prepare the salt silver cyanide (AgCN), which is almost insoluble in water. It is then necessary to obtain two soluble salts, one a silver salt and the other a cyanide. The most common soluble silver salt is silver nitrate ($AgNO_3$), while a familiar soluble cyanide is sodium cyanide (NaCN). Upon mixing solutions of silver nitrate and sodium cyanide, in the correct proportions, the reaction

$$AgNO_3 + NaCN = AgCN + NaNO_3$$

takes place. The product $NaNO_3$, sodium nitrate, is soluble in water and remains in the solution, but the insoluble silver cyanide forms a white precipitate which can be removed by filtration. Alternatively, it may be allowed to settled to the bottom of the vessel, and the solution above it poured off. Silver cyanide, employed in silver plating, is prepared in the manner just described. Zinc and copper cyanides, which are also insoluble, are obtained similarly by mixing solutions of soluble zinc and copper salts, e.g., the sulfates, with a solution of sodium cyanide. It should be mentioned that in the preparation of insoluble cyanides it is important to use the proper proportions of the two reacting substances (see Part VII, May 1944); if excess of sodium cyanide is used some of the silver (or other) cyanide will pass into solution as a "complex cyanide." Actually such complex cyanides are present in the familiar cyanide plating baths (see "The Fundamentals om Electrochemistry and Electrodeposition," Chapter II, page 6).

Hydrated Salts

If a salt is soluble in water it can usually be obtained by evaporating the solution and allowing the salt to separate out in the form of crystals. Upon analysis it is often found that such crystals are actually a definite combination of the salt with molecules of water. For instance, in the form commonly employed by electroplaters, nickel sulfate has the formula $NiSO_4.6H_2O$, so that there are six molecules of water to each molecule of nickel sulfate ($NiSO_4$) in the crystal. A salt containing additional molecules of water of this kind is called a "hydrated salt" or a "salt hydrate," and the water is referred to as "water of crystallization." Thus, the common hydrated form of nickel

sulfate has six molecules of water of crystallization. Some salts are capable of forming several hydrates, which are stable under different conditions. Copper sulfate, for example, exists in three hydrated forms, viz., $CuSO_4.5H_2O$, $CuSO_4.3H_2O$ and $CuSO_4.H_2O$, with five three and one molecules of water, respectively. Upon heating a hydrated salt crystal the water can be driven off in stages; eventually when the whole of the water of crystallization is removed the product is an "anhydrous salt." Although many salts crystallize from solution in the hydrated form, some salts, such as sodium chloride (NaCl) and potassium sulfate (K_2SO_4), separate from their solutions without any water of crystallization, i.e., in the anhydrous form. Actually sodium chloride does form a hydrate $NaCl.2H_2O$, but this is obtainable only with difficulty at low temperatures. The inclusion of water in a salt, such as nickel sulfate, is important to electroplaters, for in calculating the amount of the element nickel present in a given weight of salt, allowance must be made for the molecules of water (see Part VII, May 1944).

When exposed to air some salt hydrates lose part or all of their water of crystallization at atmospheric temperatures; such hydrates are said to be "efflorescent." A case in point is ordinary washing soda ("sal soda"), which consists of crystals of sodium carbonate (Na_2CO_3) with ten molecules of water, i.e., $Na_2CO_3.10H_2O$. If left open to the air the crystals spontaneously give up water, forming the lower hydrate $Na_2CO_3.H_2O$, with a single molecule of water of crystallization. This accounts for the well-known fact that large crystals of washing soda fall to a powder when exposed to the air.

Double Salts

Sometimes when solutions of two salts, which do not act chemically upon one another, are mixed, the crystals which separate contain both salts in definite, simple proportions. Such products are known as "double salts"; they have a perfectly definite composition which is independent of the composition of the solution from which they separate. One of the best examples of double salts is provided by the "alums"; thus, ordinary alum ("potash alum") is a double salt of potassium sulfate (K_2SO_4) and aluminum sulfate ($Al_2(SO_4)_3$), with the formula $K_2SO_4.Al_2(SO_4)_3.24H_2O$. The number of molecules of water of crystallization bears no relationshinp to the numbers combined with the individual salts. The most important double salt in electroplating is that formed from nickel sulfate and ammonium sulfate, viz., $NiSO_4.(NH_4)_2SO_4.6H_2O$. This is the material used in the preparation of "double nickel salt" baths, while the simple salt $NiSO_4.6H_2O$ forms the basis of the "single nickel salt" plating solutions.

INSPECTION AND RATING OF TEST PANELS EMPLOYED IN THE OUTDOOR EXPOSURE TESTS OF ELECTROPLATED COATINGS

C. H. SAMPLE

Member Technical Staff, Bell Telephone Laboratories, Inc.

THERE is evidence that some misunderstanding exists in regard to the method of inspecting and rating the various electroplated panels employed in the atmospheric exposure tests of electroplated coatings conducted jointly by the A.E.S., A.S.T.M. and National Bureau of Standards during the period beginning in 1932. As a result of this misunderstanding the results of the tests and the valdiity of the conclusions drawn therefrom, as reported by Blum, Strausser and Brenner(1) have been questioned.

Also some doubt is cast on the soundness of the various specifications for electrodeposited coatings(2) since they were based on the above work. The rating scheme employed is explained below in some detail in an effort to rectify any misunderstanding which may still exist relative thereto.

The panels were exposed in quintuplicate at each of the six exposure stations. At each inspection each inspector rated each specimen to the best of his judgment in accordance with the following schedule:

Per Cent of Surface Rusted	Rating
0	5
0 to 5	4
5 to 10	3
10 to 20	2
20 to 50	1
50 to 100	0

The individual ratings thus obtained were then averaged for each set of five specimens for each inspection at each exposure site. This figure and the corresponding figure for the previous inspection were then averaged to obtain an average rating for the intervening exposure period. This value was then multiplied by the number of weeks between inspections to provide a "score" for that period. A summation of the "scores" thus obtained for each set of five specimens at each lo-

1. National Bureau of Standards Research Papers Nos. 712, 867 and 1293.
2. ASTM Designations: A164-40T; A165-40T; A166-41T; B141-41T and B142-41T.

cation provided the "total score" for that set for the entire exposure period. The corresponding "percentage score" for each set was then calculated from the ratio of the "total score" to a perfect score (that is, a continuous rating of 5 for the same period.

The "per cent score" thus calculated provides a convenient means of comparing the relative behavior of the different coatings at the various test sites even though the lengths of the exposure periods are not identical. The "per cent score," however, does not show the condition of a particular coating after a particular period of exposure, and it is probably in connection with the latter that confusion and misunderstanding exists. For example, if after a total exposure period of twelve weeks a particular specimen has a rating of zero (50 to 100 per cent rust), its "per cent score" would not be zero, even though the coating were completely failed. If there had been no previous inspections the "per cent score" of such a panel would be 50, that is

$$\frac{\frac{5+0}{2} \times 12}{5 \times 12} \times 100 = 50\%$$

It will be apparent that the "per cent score" of any given specimen can never be zero since that would require the speciment having a rating of zero when the exposure was started which, of course, is absurd. The per cent score can approach zero as a limiting value but the rate at which this value may be obtained is dependent not only on the corrosion characteristics of the coating but also upon the frequency of inspections.

The writer is of the opinion that a rating scheme which provides results directly in terms of percentage of the surface failed, stained, or otherwise degraded from its original condition after a given period of exposure is of more practical value to industry than the method employed in the tests under consideration. He is also of the opinion that the method used is entirely sound and is perhaps the fairest way of comparing the relative corrosion characteristics or protective value of different coatings in different environments, which, it will be recalled, was the primary purpose of the investigation.

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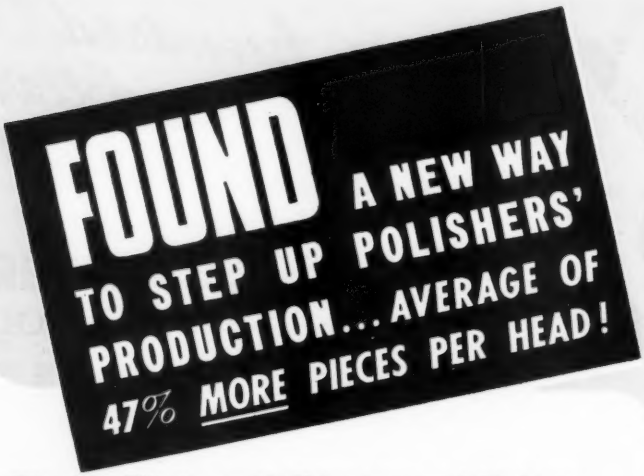

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WARTIME FINISHES

by B. M. Armstrong

• •

EDITOR'S NOTE

The Sydney, Australia Branch of the American Electroplaters' Society was formed early this year and have held regular meetings. They have read papers at their meetings the same as we do in this country and have sent several of their papers to be published in the "Monthly Review." The American members of our Society should be glad to read of the conditions as they exist in Australia, and we expect to publish articles from "down under" as often as possible.

We want to congratulate the members of the Australia Branch for the way they are handling their Society matters and hope that their branch continues its activities.

• •

I PROPOSE to speak on a subject which to my mind deeply concerns, and at times is a source of worry to every metal finisher, whether he be an electroplater or a painter. I refer of course, to wartime finishing of metals as required in Australia.

When this war commenced, we, in this country were wondering how we would be affected and were all anxious to offer our services where they would give the greatest benfit towards the winning of this conflict. We now know where our energy is required, and I am sure that we have amply justified our existence as metal finishers. We have seen many changes in industry since peace time days—many metals and materials are now in short supply and are controlled by the Commonwealth Ministry.

We all know the position of nickel plating at the present time, no decorative plating is being executed. Nickel anodes are only released for defense contracts. Chromium salts are also under control — cad-

*Delivered by B. W. Armstrong, Chief Chemist, Amalgamated Wireless (Aust.) Ltd., before the Sydney (Aust.) Branch of the American Electroplaters' Society at the First General meeting held on January 11th, 1944, at the Chamber of Manufactures, 12 O'Connell Street, Sydney.

mium is becoming scarce—tin is difficult to procure and in the cleaning cycle, vapour degreasers such as trichlorethylene are things of the past. Replacemnt of plant is difficult, as witness the position regarding the purchase of electrical equipment such as generators and bus bar, etc.

Manpower has also become a problem. Much more plating is now being done than before the war and many more men are now employed in electroplating plants. We are today forced to use a greater percentage of unskilled labour, also female labour has appeared in the plating room. Hours are becoming long and labour and plant become fatigued. So far I have only briefly summarised the general conditions existing in the Australian electroplating industry today, but from a technical point of view there have been greater changes. When the war began, our equipment was for use in Europe which necessitated a change over from our usual decorative finishes. Non-ferrous metals such as brass, copper and aluminum had to be conserved. Iron and steel had to be used in the manufacture of war equipment. These metals rust easily and they had to be protected. Cadmium plating came into its own and today we are doing more cadmium plating than we ever thought possible.

After two years of war, the battle appeared on our own door step and platers and chemists were then set the problem of finishing equipment which had to be "jungle proof."

We are on the job now, and have to supply a finished product which does not only please the eye, but which will withstand rigid inspection and severe tests because we are vitally concerned with performance particularly where severe corrosion conditions exist. As for example, in the tropics and jungles north of our continent, we must supply a finish which will withstand extreme heat or intense cold, with or without extremely high humidities even in salt atmospheres. We must now work to specifications and must carry on our job scientifically in order to meet them. I will now described in a general way, a few of the finishes and specifications which govern them.

Anodising

This process is mainly used in the aircraft industry. The Bengough Stewart process, better known as the chromic acid process is preferred, particularly where aluminum castings or fabricated parts are being anodised. Any solution seepage is not detrimental as in the case of the sulphuric acid process. Anodised alumium is usually given a coat of chromatic primer before any paint is applied.

Treatment of Zinc Base Die Castings

These metals must be treated. Paint will not adhere to these

metals without prior treatment. The Cronak process is usually applied, which is as follows:

1. The parts are cleaned free from grease by a solvent cleaner.
2. They are immersed in a solution of chromic acid containing 33 ounces per gallon of water, for 10 minutes at 80° C.
3. The parts are then rinsed in the following solution for 30-60 seconds.

   32 oz/gal Sodium or Potassium Dichromate
   5-10 cc Sulphuric acid.
4. Washed in clean cold water and allowed to dry in air for 16 hours before the application of any paint.

This treatment leaves a dark brown to yellow film on the surface of the parts. The colour varies with the composition, surface condition etc., of the metal.

Treatment of Copper Base Alloys

Copper alloys are usually nickel or tin plated. Where these alloys are in contact with aluminum they should be given a coat of tin followed by a plate of cadmium. Any copper alloys requiring cadmium plating should be given a preliminary coating of tin.

When copper alloys such as brass or phosphor bronze are to be silver plated the mercury dip should not be used—season cracking of the base metal may occur and springs will finally loose their tension. The parts should be given a strike in a solution weak in silver and high in cyanide before being plated in the regular silver bath.

Cadmium Plating

At the present time, cadmium is being universally used for corrosion protection of steel. The plating is done in the usual cyanide solution. It is interesting to note here that A.I.D. specifications insist that mercury or mercury compounds are not used in any plating process. The thickness of cadmium plate should be not less than .005". Thickness tests can be carried out by the plater himself and a method which gives quite consistent results is as follows. A solution having a composition as follows is used:

Chromic Acid	200 gm/litre
Sulphuric Acid	50 gm/litre

This solution is allowed to drop from a jet to the cleaned cadmium surface to be tested at the rate of 80 - 100 drops per minute. The sample is held at an angle of 45 degrees about 1" below the jet. The end point is easily recognised. The steel shows up as a bright spot when the cadmium has dissolved from the point of impact. The time

taken for the end point to show up is measured in seconds with a stop watch. Each 10 second represents .0001" thickness of cadmium plate.

A test for the porosity of cadmium deposits is to place a sample of the cadmium plated steel in a 1% solution of hydrochloric acid for 10 minutes. During this time no evolution of gas bubbles should occur.

Tropical tests on cadmium and other metals are very severe. The plated parts are subjected to high temperatures and humidities in specially constructed chambers. The temperature is held at 60 degrees C. and the humidity at 95%, for cycles of 8 hours. The chambers are allowed to cool and condensation takes place. The cycle is repeated 3 or 4 times. The parts must not show any signs of corrosion. Salt spray or salt water immersion tests can also be applied to cadmium plated parts but the foregoing tests usually apply.

Aircraft parts which are to be cadmium plated should never be pickled in acids. They should be sandblasted and the plating should be applied within 8 hours of this operation. After plating, the parts should be heated at 200 to 300 deg. F. for one hour. This process also applies to the plating of springs. The procedure ensures that acids cannot be carried over with the plated articles, especially inside steel tubes etc., and it also eliminates embrittlement of the steel.

Cadmium must never be used on foodstuff containers. The metal and its compounds are very poisonous. When cadmium plated parts are to be welded, sufficient ventilation should be provided to clean away any oxides and volatile salts of cadmium formed due to the heat of welding.

Wartime finishes are usually matt or non reflective in appearance and most parts are painted. The adhesion of paint on cadmium is notoriously poor. This can be overcome by bonderising or parkerising. In conclusion I would like to point out that since the war began we are having larger parts to be finished. Time will not permit me to deal with such processes as metal spraying, galvanising or paint finishes. To discuss thoroughly all processes and wartime finishes required of us, would entail the writing of a volume. I hope the processes and finishes that we have discussed will help to maintain our standards and promote thought among my listeners.

Discussion Following The Above Lecture

Q. Why is tin used as a coating under cadmium on brass?
A. It reduces the potential between cadmium and brass.
Q. What are the formula and specifications of Cronak?
A. See lecture.

Q. What is the solution for testing the thickness of cadmium deposit?

A. See lecture.

Q. Does bright dipped cadmium improve the rust-proofing qualities of the deposit?

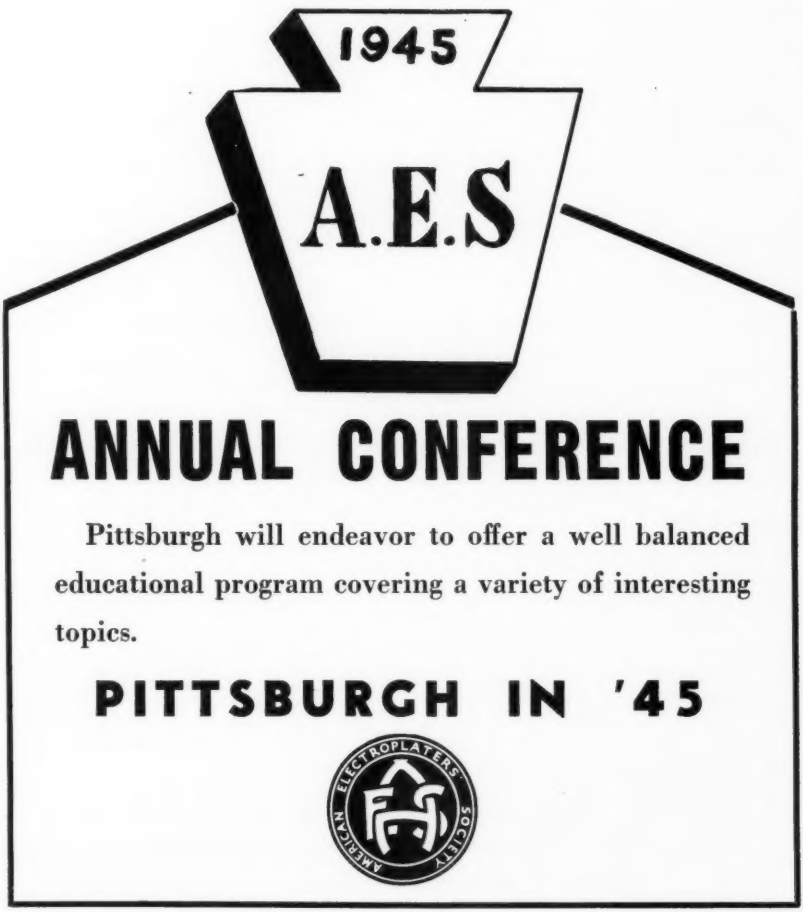
A. Yes.

Q. What causes "spotting out"?

A. Cyanide in the pores of the deposits.

Q. Would a bright dip be successful for using as a neutralising solution?

A. Neutralize with chromic acid — 6 ounces per gallon.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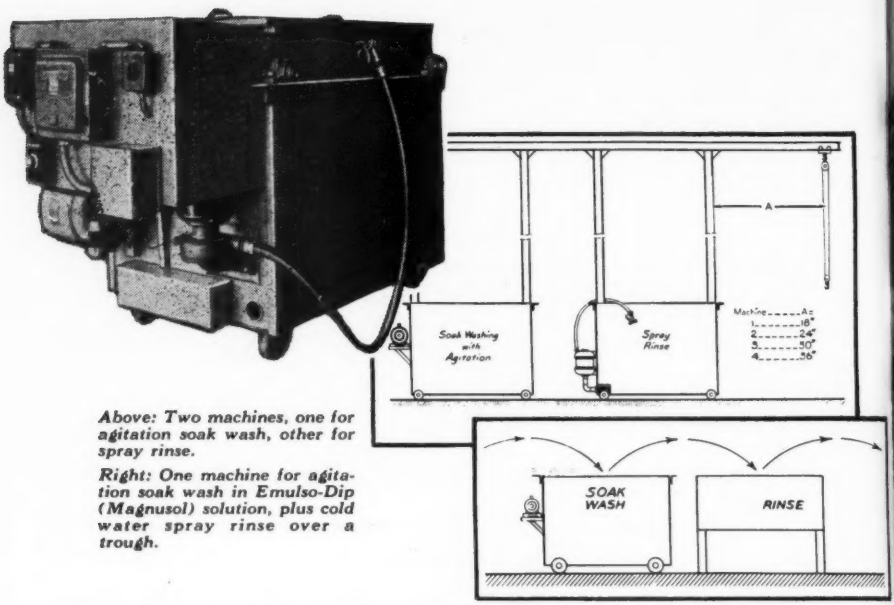

Above: Two machines, one for agitation soak wash, other for spray rinse.

Right: One machine for agitation soak wash in Emulso-Dip (Magnusol) solution, plus cold water spray rinse over a trough.

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Unichrome Copper deposits are exceptionally smooth and lustrous . . . provide an excellent base for bright nickel without buffing. When plating over rough base metal, buffing is done in less time, using less pressure and fewer materials.

In many plants today this process boosts production because of the excellent plating speeds obtained. Free from scum, the deposit needs no activation before subsequent plating. Ordinary cleaning cycles are adequate for use with Unichrome Copper.

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It gives all the advantages of Unichrome Alkaline Copper . . . as well as characteristics . . . plating speed tables . . . important technical data. Kindly outline your needs to assist us in answering more fully.

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PURICO #550 is unexcelled for all precision finishing of gun parts that are chrome plated as its special qualities eliminate many usual operations, thereby speeding up production . . . #550 is equally good for any finishing, prior to chrome plating, job where speed and performance are of first concern.

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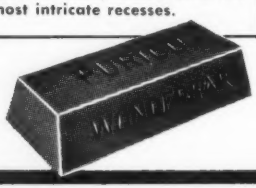

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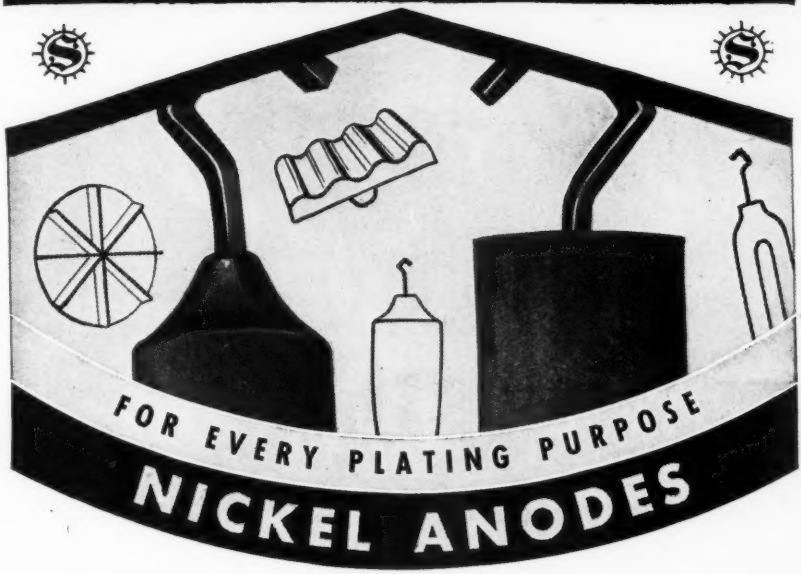

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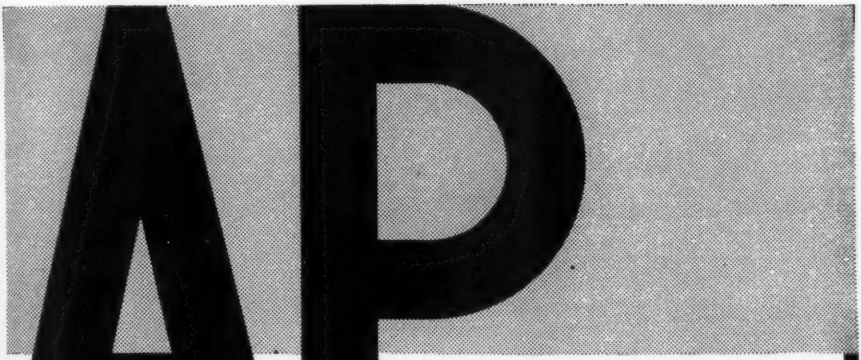

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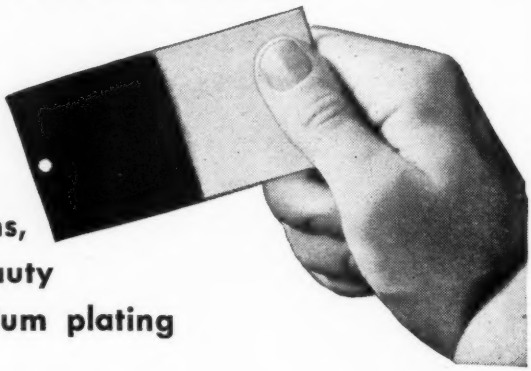

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MAIL the coupon below for this free test panel of Iridite-protected zinc plating. Have your laboratory give it any corrosion test you want. Watch Iridite "Take it" and come back for more. Then you'll see why Iridite is so widely used as a corrosion-resistant final finish by Western Electric, Otis Elevator, Bulova, Pyrene, Anaconda and many others.

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Easy to apply—but hard to wear off

A few dips in the handy, open-end drum—and your plating racks are coated with a tough, resilient insulation that you can count on to stand up through cycle after cycle of trouble-free operation.

The remarkable properties of the special resins used in Unichrome "Air Dry" Rack Coating account for its extreme resistance. Continuing research in selecting and formulating these resins gives you maximum protection at minimum cost . . . an insulating coating effective in all plating cycles where an air drying material can be used. Write to nearest office for prices or a trial order.

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Chemical Resistance — Excellent for all plating cycles.

Toughness — Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

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Whether the job is heavy or light, there's a Wyandotte Metal Cleaner ready to take a quick and effective punch at it. This specialization makes the Wyandotte line particularly valuable nowadays when you can't afford to lose time and materials with cleaners that do less than first-rate work.

The Wyandotte Field Engineer is a specialist, too—and always at your service. He has a metal cleaner to meet any need—for cleaning after machining and prior to plating, painting, lacquering, blackening, anodizing or spot-welding operations.

He may be able to help you even in the case of a new process. For he's backed by Wyandotte research and extensive experience with all kinds of metal cleaning problems.

Don't hesitate to consult the Wyandotte Representative at any time—on any cleaning problem. He'll be glad to be of assistance to you.

Wyandotte
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Imperceptible impurities — those "ghosts" that plague electroplating solutions — are easily banished when you use DARCO S-51. Grease, oil, soap, colloids and decomposition products are speedily *adsorbed* by DARCO, the standard activated carbon of the industry.

DARCO keeps both visible and invisible impurities from contact with the metal. It saves time, labor and materials by removing contamination that slows production. Yet DARCO S-51 costs very little—a few cents' worth keeps 100 gallons of solution clean for a week.

Try DARCO in your own operations. It's being successfully applied in many kinds of electroplating, including bright nickel, cyanide zinc, cadmium, copper, iron, gold, silver. Ask your dealer to supply you with DARCO S-51, or write for a sample. Also, we'll gladly help solve any special purification problem that's bothering you.

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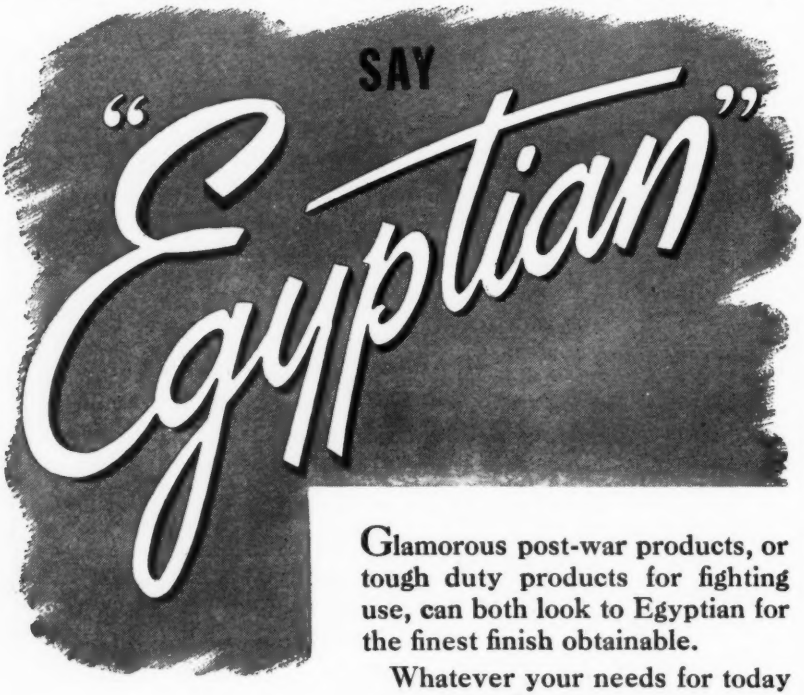

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- LACQUER RESISTING

M & W's new Red Oxide Speed Primer #403 and Grey Speed Primer Surfacer #5 have all these properties and more. They were developed to achieve the results of a zinc chromate primer on metal surfaces where a fast-setting, corrosion resistant, air-drying or baking primer or primer surfacer is required. In some respects, they excel zinc chromate primers, as extreme care in their application to obtain a very thin transparent coat is unnecessary.

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DURANITE: Short bake finishes.

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DURELASTO: A new plastic base wood finish.

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TROMEX—The highly-stabilized trichlorethylene degreasing solvent—is completely safe to use on magnesium and aluminum as well as heavyweight metals. Its special stabilizers inhibit corrosion and resist metal-induced decomposition.

TROMEX cleans CLEAN, gives "premium" results yet sells at the same price as trichlorethylene. It minimizes heating too; boils at only 186° F.

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A REPORT ON RESEARCH PROJECTS

By

THE A. E. S. RESEARCH COMMITTEE

IN ORDER that the membership and contributing companies may be informed, the Committee wishes to make this preliminary report on the placement of three research projects, all of which will be under way by January 1, 1945.

A. E. S. RESEARCH PROJECT No. 1

This project has been placed at Indiana University, Bloomington, Indiana. The Project Director is Professor F. C. Mathers of the Department of Chemistry.

The primary object of this project is to make a survey of the existing methods for stripping copper from various base metals with a view to correlating all present information, both published and from private file sources. It is expected that the information so obtained will be classified, critically abstracted and published promptly for the benefit of all members of contributing organizations. This data will then be used as a basis for further investigation.

The scope of this investigation is as follows:

A. Base Metals — Survey on stripping of copper will include various kinds of base metals, such as iron, steel, cast iron, brass, bronze, zinc base and aluminum castings, stainless steel, lead and lead alloy castings.

B. Range of Thicknesses — Flash to 5 mils.

C. Effect on Base Metal — Record any data on attack, pitting or other effects on various base metals. This should include data on solution conditions under which pitting or attack can occur in solutions that ordinarily will not attack the base metal.

D. General Types —
   1. Chemical only
   2. Electrolytic
   3. Oxidation method
   4. Mechanical

E. Operating Data for Methods —
   1. Solution composition
   2. Operating range
   3. Temperature
   4. Acidity or alkalinety
   5. Agitation
   6. Stripping rate
   7. Bath life, including renewal data
   8. Copper recovery data

9. Rack or bulk operation
10. Current density ranges of Electrolytic
11. Equipment necessary
12. Cost of bath and operation

A. E. S. RESEARCH PROJECT No. 2

This project has been placed at the University of Illinois, Urbana, Illinois. The Project Director is Professor G. F. Smith of the Department of Chemistry.

The object of this project is to assemble information on the analytical methods for determining metallic impurities in plating baths. The preliminary program involves an extensive search of the literature and the assembly of private file data. An attempt will be made to schedule various parts of the program, so that the assembled data can be published at regular, frequent intervals for the information of the members and contributing organizations.

It is confidently expected that this data will then serve as a basis for the development of improved methods of analyzing for the various impurities which appear in small quantities in plating baths.

With the modern trend toward bright plating and toward heavier coating specifications, the necessity for controling the impurities in plating baths becomes of utmost importance.

The scope of this investigation is based upon the list of plating baths and the impurities associated with them which are outlined below. There are many blanks shown in the tables. Members of the Society are asked to advise the Committee as to the quantities of impurities which they believe to be damaging in the the several plating baths. The members' comments as to whether any of the impurities mentioned should be omitted or as to what others should be added will be appreciated.

Nickel Plating

Bath compositions in which the impurities should be determinable: Watts and High Sodium Sulfate Types.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Aluminum	Al	0.01 to 1.0	
Cadmium	Cd	0.01 1.0	
Chromic Acid	CrO_3	0.01 0.2	
Copper	Cu	0.005 0.2	
Iron	Fe	0.01 1.0	
Lead	Pb	0.005 0.5	
Manganese	Mn	0.01 1.0	
Zinc	Zn		
Calcium	Ca		

Copper Plating

Bath Composition: Cyanide Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Chromic Acid	CrO_3	0.01 to 0.2	
Iron	Fe	0.1 2.0	
Lead	Pb	0.002 0.5	
Nickel	Ni	0.1 1.0	
Silver	Ag	0.001 0.5	

Cadmium Plating

Bath Composition: Cyanide Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Aluminum	Al		
Antimony	Sb	0.005 to 0.2	
Arsenic	As	0.005 0.2	
Chromic Acid	CrO_3	0.02 2.0	
Copper	Cu	0.005 0.5	
Lead	Pb	0.005 0.2	
Nickel	Ni	0.005 0.5	
Silver	Ag	0.005 0.2	
Tin	Sn	0.005 0.2	
Zinc	Zn		

Chromium Plating

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Aluminum	Al		
Copper	Cu		
Iron	Fe		
Nickel	Ni		
Zinc	Zn		

Tin Plating

Bath Composition: Alkaline Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Antimony	Sb	0.01 to 1.0	
Arsenic	As	0.01 1.0	
Chromic Acid	CrO_3		
Lead	Pb	0.01 1.0	

Tin Plating

Bath Composition: Acid Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Chromic Acid	CrO_3		
Copper	Cu		
Zinc	Zn		
Iron	Fe		

Zinc Plating

Bath Composition: Cyanide Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Aluminum	Al		
Cadmium	Cd		
Chromic Acid	CrO_3	0.002 to 0.5	
Copper	Cu		
Iron	Fe		
Lead	Pb		
Mercury	Hg	0.01 2.0	

Bath Composition: Sulfate Type.

Antimony	Sb	0.001 to 0.01	
Arsenic	As	0.001 0.01	
Chromic Acid	CrO_3		
Copper	Cu	0.01 0.10	
Iron	Fe	0.1 1.0	
Tellurium	Te		

Silver Plating

Bath Composition: Cyanide Type.

Impurity	*Report As:*	*Range of Concentrations g.p.l.*	*Include or Omit?*
Chromic Acid	CrO_3		
Copper	Cu		
Iron	Fe		
Lead	Pb		

A. E. S. RESEARCH PROJECT No. 3

This project has been placed at the University of Michigan. The Project Director is Professor A. L. Ferguson of the Department of Chemistry.

This project involves a study of methods of testing adhesion of the bond strength of electrodeposited metal to the base on which it is deposited.

In most cases if the bond between the base and the electrodeposited metal is not good, the plating job is a failure; hence the importance of adequate test methods.

The problem is to find a test method that will indicate the bond strength between the base and the electrodeposited metal.

Electrodeposits may show no bond weakness during the normal finishing operations such as buffing, burnishing, or brushing, yet will blister or peel from the base after the article is in use a short time, or if it has been exposed to corroding conditions. On many articles the only test for good bond that is applied is the finishing operations; this test is not adequate.

Tests — There are tests, such as deformation tests, that can be made like flexing or bending to the breaking point using an Erickson machine, Brinell testing machine, or similar methods; all such tests destroy the piece tested.

There are more positive tests such as the hammer and chisel tests or modifications of this method; like the alligator wrench, that can be used on heavy deposits (.01″ and up). Test methods such as apply positive pressure to separate the deposited metal from the base in most cases will also destroy the piece tested, but such methods are useful for checking plating procedure that give best adhesion for a given metal, and for studying the various factors that effect the bond strength. The "Ollard" methods and the "Micro Adhesion" method (which is a modification of the Ollard method) are the only methods so far as I know that express the bond strength in terms of pounds per square inch.

In the case of the Ollard method a specially prepared piece of metal is plated, then tested for adhesion. In using the micro adhesion method tests can be made on a section taken from a production run item and tested.

Another method is the can-opener type of test for adhesion. This method also requires the plating of a prepared piece of plated metal so that one end has no bond to the base. This loose end is used to get hold of by the "can opener" so that pressure can be applied to separate the deposited metal from the base. This method can be used to determine relative bond strength for various plating procedures, but it is difficult to express this in terms of pounds per square inch. This method can be used on samples from production run items; but it would destroy the finish, making refinishing and replating necessary.

The black light test and modifications of it is used to test bond, but indicates only no bond at open edges where oil can penetrate between the deposited metal and the base. The deposited metal may blister badly but unless there is a break in the deposited metal so that the oil can penetrate between the deposited metal and the base, there is no bad bond indication by this test.

X-Ray is used as a test method but one doubts if it can determine bond strength. It does no doubt show areas where there is no bond.

The hammer and chisel test method and modifications of it can be used on heavy deposits (.01" and up). There are three ways this method can be used to check the bond on items like bearings where only one side is plated.

A. Plate the bearing so that the silver plates up above the edge of the base to allow the application of the hammer and chisel test.

B. Allow extra stock in the steel shell so that when the edge is distorted by the chisel test there is still enough stock to finish to dimensions required after distorted area is removed.

C. Where A or B can not be applied, apply the chisel test on a definite percent of each lot plated and take the scrap penalty.

Heating after plating is sometimes suggested as a test for bond strength but is not satisfactory because there are conditions where heating will cause blistering of the deposit. This blistering occurs because moisture has been sealed in by plating over moist dirt or rust or deep pits in the base. When heat is applied the plate is "blown up." Extremely poor bond will, under some conditions, blister as a result of heating. In general, heating after plating improves the bond strength of most deposited metals where diffusion occurs, should the bond be weak as plated.

Experiments have been made by using what is called a *Supersonic Reflectroscope* to check the bond of electrodeposits. So far as is known, results have not been very promising. One company has been experimenting with this equipment and no doubt others have also.

In this test, supersonic vibrations are reflected from a transmitter through the metal under observation, and indicates any discontinuities in or between any of the layers of metal under test but does not indicate bond strength. A weak bond may not show discontinuities but if the bond blistered slightly so as to cause a void between the base and the deposit this would be detected by the Supersonic Reflectroscope.

The above is a brief review of some known test methods. No doubt there are other methods being studied. The first step in this investi-

gation will be to obtain information on all available methods both from the literature and from private file data. This information will be summarized and promptly published. It will then be used by the Committee in planning the experimental work to be undertaken.

A. E. S. Research Committee,
C. E. HEUSSNER, Chairman

● ● ●

The Research Committee held a meeting December 9th to discuss research projects, finances, and other details involved in such a program.

Among the reports given were those of the action of the various branches both as to financial support of the research work and to the suggestion of projects to be undertaken by the Research Committee. To date one branch has raised their dues $1.00; the extra dollar to be sent to the Research Committee, and five branches have contributed to the research work from their branch funds. The Research Committee is very grateful for these contributions but they feel that it is preferable that the branches contribute by raising the dues of the members rather than by withdrawing the funds from their branch treasury. Members of the Research Committee have been in touch with many of the branches and the concensus of most of the branches is that this is a sound method of the Society supporting the research work and plans on progress in these branches to make the change either in January or at the end of the Society's fiscal year, May 1st, 1945.

In order to carry out the work as outlined by the Research Committee, it will be necessary to supply more funds than has been supplied in the past, thus requiring even more support than has been offered by the members. The Supreme Society is contributing $2,000 out of the general fund. Various companies are contributing substantial sums either on a lump basis or on an annual basis, and it is hoped that the branches will set en example for other contributors by doing their part.

The three projects now in progress are:

(1) Stripping of Copper from Various Base Metals, being undertaken by Dr. F. C. Mathers, Dept. of Chemistry, Indiana University.

(2) Determination of Impurities in Plating Baths, by Dr. F. G. Smith, Dept. of Chemistry, University of Illinois, and

(3) A Study of Methods of Testing Adhesion of Electrodeposited Metals, by Alfred L. Ferguson, Dept. of Chemistry, University of Michigan.

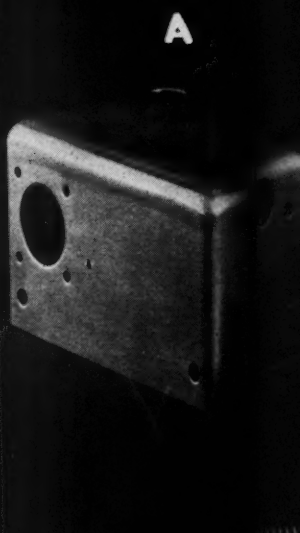
The Research Committee expects to keep the members informed as to the progress of the work and in turn ask for the support and cooperation of the members.

E. T. CANDEE

Typical

LEA

Finished Parts



. . . All Manufactured by The UNITED ST

a—Yoke for Electrical Gyro

b—Bezel for Turn and Bank Indicator

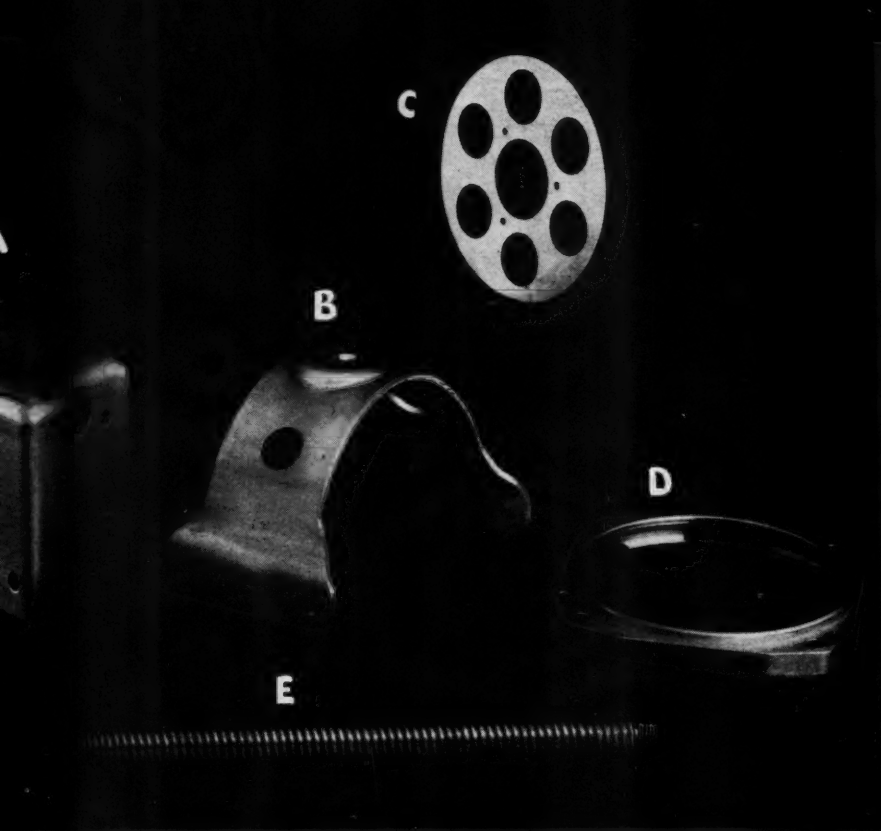
c—Control Block for Actuating Units

d—Averaging Gear for Averagizing Unit

e—Jack Screw for Actuators

Here we have stampings, die casting and a steel shafted, copper gear. All had to be finished. Each had to be finished differently. On some, burrs had to be removed.

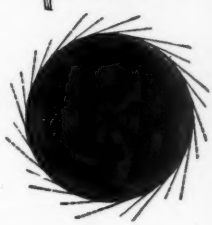
No better example of the versatility of LEA Finishing Methods and of the effectiveness of LEA Finishing Compositions can be found than in these



S[illegible] TIME CORPORATION, Waterbury, Conn.

five items made by The United States Time Corporation.

If you have a finishing problem, a burring problem, write us in detail. It will be given our immediate attention.



THE LEA MANUFACTURING CO.

Waterbury 86, Connecticut

Burring, Buffing and Polishing . . . Manufacturers and Specialists in the Development of Production Methods and Compositions

1-LM-2

INDUSTRY NEWS

Baltimore-Washington Branch Annual Educational Session and Dance

February 3, 1945, Maryland Yacht Club, Browning Park, Baltimore, Md.

Educational session, 4:30 P.M. Speakers: Dr. Walter Meyer, Enthone Co., Chemical Coloring of Aluminum and Copper Alloys. Mr. Adolph Bregman, "Plating Costs." Mr. F. C. Mathers, Indiana University, "Effect of Solution Composition on Deposits."

Dinner 7:00 P.M., entertainment; dancing 9:00, Roby's Orchestra; tickets for dinner and dance $4.00 each.

Committee: Chairman Frank Davey, Egyptian Lacquer Mfg. Co.; Harry C. Irvin, Rheem Research Products Co.; Raymond Stricklen, Jr., Turco Products Co.

Grand Rapids Annual Meeting

The Grand Rapids Branch is again sponsoring an educational session and dinner-dance at the Pantlind Hotel on January 20. Chet Smith, from the Detrex Company of Detroit, will act as chairman at the educational session which will be held in the afternoon. This session should be worthwhile to those who are interested in electroplating. William Phillips, of the General Motors Corporation, will speak on "The Future of Electroplating and Plastics." Mr. I. A. Lee, of General Electric, will speak on "Rectifiers and their Operation." Mr. Lawrence J. Durney, of McKeon Sulphur Products, will speak on "The Use of Sulfur for Stripping Copper." Send your reservations for tickets to C. E. Able, 11 Scribner Avenue, Grand Rapids 4, Mich.

Cohan Vacations

Mr. E. Cohan of Cohan-Epner Co., 142 West 14th St., New York, N. Y., specialists in gold, silver and other precious metal plating, leaves on Wednesday, January 3, 1945 for his annual vacation which he will spend in Clearwater, Fla.

Electroplating & Finishing Expert

Situation Open — Thorough knowledge and broad experience in electroplating and metal finishing processes. Wanted to work with well established sales and service organization manufacturing products extremely essential in all kinds of production, processing and maintenance work. Location N.Y.C. Must be willing to travel. Give full details. Box MR-AI

Announcement

It is inded a tribute and an honor to the Newark Branch of the American Electroplaters' Society to record the manner in which the Plating Industry received our latest contribution to the progress of the Industry, namely the new 1944-45 Year Book.

We are proud of an unbroken record of many years of continuous contributions of various description to enhance the value of an Industry whose true merits cannot be lightly overlooked.

The numerous letters we have received thanking us for the copies of this booklet, as well as many requests for additional copies, are truly a tribute to the committee responsible for this work.

The members of Newark Branch wish to thank you for these testimonials of good faith, and hope to be able to improve the Year Book with every new publication.

W. BRUHNS, *Publicity*

Mr. Joseph B. Kushner, well known metal finishing consultant and A.E.S. member, announces that he is now back, full time, at his regular consulting offices, 233 W. 26th St., N.Y.C. after an absence of more than a year and a half devoted to a special project at Columbia University. He is now able to devote all his time to development, research and consulting work in the field of electrodeposition, plating plant design and installation. His present specialties are streamlining and standardazation of plating plant processes and design and development of automatic equipment for handling difficult production plating problems.

Announcement

The Newark Branch of the American Electroplaters' Society wishes to announce that the Winter Open Educational Meeting will be held at the Robert Treat Hotel on January 19, 1945, at 8 P.M.

The educational value of these meetings have proven themselves worthy of the achievements and prestige which Newark Branch has enjoyed as one of the largest branches in the society over a period of many years.

To those members and guests who have been present at any of these open educational meetings in the past, we need not elaborate on the educational value and pertinence of the subjects presented, nor do we have to make any apologies for the speakers chosen to present the subjects.

To those who have been unable in the past to be present at one of our open meetings we wish to stress the fact that these meetings are primarily arranged to further the education of anyone engaged in or connected with the finishing and protection of metals. Another object of these meetings is to promote better understanding and personal contact between the technical personnel and the men actively engaged in production plating.

The program to be presented at the January meeting will be as follows:

1—Speaker — Floyd F. Oplinger — E. I. Du Pont De Nemours Company, Wilmington, Dela.
Subject — To be announced.

2—Speaker — M. E. Promisel — Navy Department — Bureau of Aeronautics, Washington, D. C.
Subject — Electrochemical Process in Aircraft Industry and Corrosion, and Some Things to do about it.

3—Speaker — Kenneth Compton — Bell Telephone Laboratories, New York, N. Y.
Subject — To be announced.

We wish to extend a cordial invitation to all men and women in the electroplating industry.

W. BRUHNS, *Publicity*

New Holden Neutral Bath Booklet

The A. F. Holden Company, New Haven, Conn. announce for distribution a revised and enlarged 32-page booklet entitled Holden Neutral Bath Folder #120. This booklet contains information on Neutral Baths used for hardening and tempering. Also included, is information on the Holden "Flow Heat Treatment" and the new Speed Nitriding Process.

Speakers Available

Speakers from United Chromium, Inc. are available to the branches on the following subjects. Expenses of speakers will be born by the company.

1. Porous Chromium Plating.
2. Unichrome Copper.
3. Anodic and Dip Protective Coatings on Zinc and Cadmium Plated Articles.
4. Stop-offs and Protective Coatings in the Plating Department.

New Formax Representative

Lawrence F. Griffin, 132 Avon Avenue, Stratford, Conn., has been appointed New England representative by Mr. Howard J. McAleer, President of Formax Mfg. Company.

Mr. Griffin finished Technical High School, Waterbury, Conn., and attended Yale, specializing on Surface Finishing and Metalurgy. He has worked for the Bridgeport Brass Company and also had charge of Zinc Plating at General Electric, Bridgeport, Conn. He has had a varied Sales Engineering experience, selling polishing and buffing compounds in all the New England States and is now working in cooperation with the Formax New England Distributors, MacDermid, Inc., of Waterbury, Conn. and Sessions-Gifford Company of Providence, R. I., who carry local stocks of Formax products.

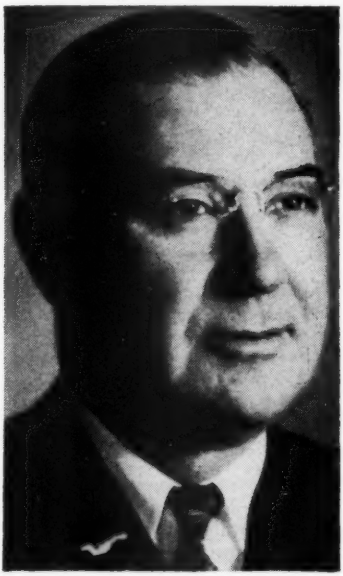
WANTED

Electro-Plating and Finishing Expert

Thorough knowledge and broad experience in electroplating and metal finishing processes. Wanted to work with well established sales and service organization manufacturing products extremely essential in all kinds of production, processing and maintenance work. Location, N.Y.C. Must be willing to travel. Permanent. Give full details. MR-AAI.

Electroplating of Metals

Two holdouts among metals defying electroplating, one of the most useful of engineering tools, have at last capitulated to Westinghouse engineers. Beryllium and tantalum do not respond to usual electroplating techniques. Methods have been found for plating beryllium and tantalum from fused salt baths. Tantalum-plated anodes in vacuum tubes offer possibilities of low secondary emission, and as an absorber (getter) of stray gases.



Jack Hoffman

Udylite Changes

L. V. Nagle, National Sales Manager for the Udylite Corporation, Detroit, announces the following changes in personnel in the company's current expansion program.

JACK HOFFMAN formerly manager of the Cleveland territory is being transferred to the Detroit office to head the newly organized commercial filter division.

BERT LUPIEN formerly Michigan representative for the Corporation has been made manager of the Cleveland territory.

JOE HOEFER formerly with Udylite, returns to the Corporation to become Sales and Service Engineer for the Michigan territory in the position left by Bert Lupien.

LEONARD SINGER, Engineer for the Udylite Home Office for several years is being transferred to the Udylite New York Office where he will act as Service Engineer for that territory.

Joe Hoefer

Bert Lupien

Twin City Branch

The newest addition to the A.E.S. family is the newly formed TWIN CITY Branch at Minneapolis. A temporary charter has been granted.

Over 40 members have been signed and the officers feel this number can be doubled in the next few months.

Officers elected are: Ervin H. Lindemann, President; Paul W. Felt, First Vice-President; Gordon W. Lillicrop, Second Vice-President; Robert L. Buckley, Secretary-Treasurer.

Help Wanted

There is an urgent need at the Engineer Board for qualified personnel in the Reflector Research Laboratory. This office has been unable, through Civil Service channels, to find qualified personnel. This laboratory is concerned with the development of various types of precision reflectors by electrolytic processes. This includes development of new electroplating and electroforming solutions for high-speed plating and corrosion resistant reflecting surfaces.

The following list of qualifications outlines briefly the type of personnel, either male or female, required:

1. They should have a B.S. degree from an accredited college or university with major work in chemistry and physics.
2. Should have at least one year of laboratory experience in the research and development of electroplating solutions.
3. Should have some practical experience in plating with copper, iron, nickel, silver, gold, and rhodium.
4. Should be able to analyze the various types of electroplating solutions.
5. Should be capable of writing engineering reports.

The salary will be determined primarily by the training and experience of the applicant under Civil Service Regulations.

Applicants should mention *The Monthly Review* and write Major O. P. Cleaver, the Engineer Board, Fort Belvoir, Va.

Educational Session

The Chicago Branch of the American Electroplaters' Society will hold the Annual Educational Session on January

27th, 1945 in the Club Building of the Palmer House at 2:00 P.M.

Mr. W. M. Phillips of General Motors Corp., will talk on and illustrate "Comparison of Solutions and Electrodeposits of Copper."

Mr. P. J. Ritzenthaler of Cutler Hammer, Inc., will present "Salvage Plating with Heavy Nickel Coatings."

Mr. A. W. Logozzo of MacDermid, Inc., will have some more to say on "Hard Chrome Plating."

The banquet is not definite as yet. Complete details for the evening will be mailed about January 10, 1945.

M. H. LONGFIELD

Georgi to Pennsalt

Mr. Edmund A. Georgi, formerly Manager of Technical Development, Papermakers Chemical Department, Hercules Powder Company, has joined the Research and Development of the Pennsylvania Salt Manufacturing Company as Director of Special Products Division, according to announcement by Dr. S. C. Ogburn, Jr., Manager of Research and Development Department. The Special Products Division includes laboratory and field work in evaluation of new products, and in carrying out service work requested by Sales or Manufacturing Departments. Specially equipped laboratories now in operation include pulp and paper chemicals, sanitary chemicals, laundry chemicals, dry cleaning materials, textile processing, detergents, electrochemicals, ceramics, agricultural chemicals, and the Special Chemicals service laboratory.

Correction

In listing available speakers from the Du Pont Company in the December issue of the *Review*, two names were spelled incorrectly. The should have read Mr. H. L. Benner and Mr. R. Bair.

Wanted

Grade A — Plater
Mostly rack plating
Cadmium, copper, tin, nickel plating
(possibly silver plating later)
Lewis Engineering Company
Naugatuck, Connecticut
(Aircraft Instrument Manufacturers)

32nd Proceedings

Numerous letters have arrived at National Headquarters complimenting the Executive Board on the form in which the 32nd A.E.S. PROCEEDINGS was produced. Naturally the Board is pleased with the spontaneous approval of so many members.

Quite a number also ask if extra copies of the PROCEEDINGS are available. The answer is *Yes!* We have approximately 150 copies.

There will be no reprinting of this volume so those who want extra copies are urged to forward their requests promptly. We will follow the procedure of first come first served.

Price $5.00

National Headquarters of American Electroplaters' Society
545 Fifth Avenue, New York 17, N. Y.

Ferrodex Booklet

W. D. MacDermid Chemical Company, Bristol, Conn., announce a new 4-page booklet ready for distribution giving information on Ferrodex. Free copies may be obtained by writing direct to the manufacturer mentioning the *Monthly Review.*

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BUY WAR BONDS

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NEW Equipment Materials Supplies

New Line of Mandrel-Mounted Bobs

Users of felt bobs for polishing, finishing and deburring metals, plastics, etc, can now secure the well-known PARAMOUNT Brand Felt Bobs permanently mounted on ⅛" or ¼" steel mandrels. Bacon Felt Co., Winchester, Mass., the manufacturers, anounce these mandrel-mounted bobs as a new convenience for use with portable air or electric tools, flexible shaft equipment, drill presses, lathes, etc. When the felt has worn out, the operator simply slips one of these new mandrel-mounted bobs in place — no time wasted removing the felt stub from the mandrel and fitting a new felt on the old mandrel. Aside from the saving of time, there is the advantage of knowing that the bob has been trued up and securely and permanently attached to the mandrel at the factory. Further details will gladly be furnished by the manufacturer.

New Artificial Wax

A new artificial wax has been developed in the laboratory of the Roberts Rouge Co., Stratford, Conn. This wax is known to the trade as "Robertswax" and has many characteristics of genuine bees wax. It is slightly tacky, of a light brown color with a slight pleasant odor.

Experimental work leading to the creation of this new wax was suggested owing to the scarcity of a suitable available material due to government requirements. It was originally hoped that some type of wax could be synthesized primarily for use as a binder for buffing compounds. As many times happens, the final resulting product was found to possess many other virtues which lend themselves readily to other important industrial uses.

In addition to use as a binder in buffing compounds, the cutlery trade is finding this wax a good substitute for other waxes formerly used by them. The comparative low cost of this wax is another factor which will appeal to many users of waxes of the more expensive types.

A large portion of the new addition to the factory will be devoted exclusively to the production of this wax which is offered to the trade in slabs 2x4½x18 inches, weighing five pounds each. The wax is priced at 13 cents per pound FOB Stratford.

Unlimited quantities are available and for the present at least no priority is required for the purchase or use of this wax. Small samples will be sent to interested concerns upon request.

As this wax is an entirely new product, correspondence with those interested in the technical features is solicited.

A New Process For Plating Upon Aluminum

The Enthone Co., 517 Elm Street, New Haven, Conn., have anounced the development of a new, simple process for preparing aluminum for electroplating. The process is called the "Alumon" process.

It enables electroplating of all types of aluminum. Both rack and bulk work can be readily processed. The procedure consists in cleaning in the usual manner, followed by a short dip in the "Alumon" solution, which produces an active alloy base which can be subsequently copper or silver plated. After the work has been given a short copper plate, it can then be electroplated

with other metals including nickel, chromium, gold, etc.

At present it is being widely used for plating of aluminum radar equipment and other apparatus. Work plated by the "Alumon" process can be subjected to severe distortion without flaking and the plate can be readily soldered thus permitting easy soldering to work made of aluminum. A wide interest has developed in the process for postwar plating of such articles as costume jewelry, amulets, pencil points, and household goods.

The process is patented and the user is granted a license with no royalty payments other than the cost of the salts.

Literature is available describing the process.

Lapping Compounds

This Global war has brought into quite general use demands for material which previously was only used in comparatively small quantities if at all. One of these falls into the category of Lapping Compounds. It also follows that any concern whose business dealt in abrasive grains such as manufacturers of Buffing Compositions would be called upon during the war emergency to produce Lapping Compounds also. Such an obligation was thrust upon the Roberts Rouge Co., of Stratford, Conn., and due to the intensive training and experience gained in this field, they will continue the production of lapping compounds into the post-war period as an added product to their already rapidly expanding buffing line.

From a thorough study of the subject it is apparent that the use of lapping compounds will become more generally used in many operations than has been the custom in the past. The old method of hand use with a mixture of vaseline and abrasive has gone forever and has now been replaced with far more efficient compounds, more rapid cutting and better finishing, adapted for use with or without modern lapping machines. In many cases a good lapping compound is considered an important, indispensible finishing tool.

The Roberts Rouge line of lapping compounds is flexible, ranging from solid sticks down through oily paste and even stable emulsions of oil and water. Any manufacturer having large scale lapping operations will do well to get acquainted with this progressive firm and learn first hand of the rapid strides that have been made in this branch of finishing. Engineering service and samples will be cheerfully furnished on request.

Protective Coating for Spray Booth Sidewalls

Triad PR, a new protective coating for the sidewalls of both wet and dry spray booths, is announced by Detrex Corporation, 13005 Hillview Avenue, Detroit 27, Mich.

With this new coating between the walls and the layer of overspray that normally builds up, quick and easy cleanup is obtained. The booth so protected is stripped clean simply by spraying with water or steam; the Triad PR and accumulated paint flush off together. In dry booths which have no drainage facilities, the protective coating greatly facilitates scraping off the paint.

Triad PR can be applied by either brush or spray gun. It gives excellent coverage, and dries to a hard, white, dustless coating which improves visibility in the booth. As with all Triad compounds, Triad PR is shipped on a guaranteed performance bases for thorough testing in the customer's plant.

Westinghouse Announces New Electronic Oscillograph

For aircraft engine manufacturers, electric power companies and research laboratories, a new self-contained industrial electronic oscillograph which records characteristics of electrical phenomena lasting as little as a fraction of a millionth of a second is announced by Westinghouse Electric and Manufacturing Company.

An instrument of the cold cathode type, the electronic oscillograph is capable of recording single electrical transients with respect to time, or two electrical phenomena with respect to each other, such as voltage versus current, in the form of diagrams produced by two pairs of electrostatic deflecting plates disposed at right angles to one another. The cathode of the tubes is energized from a 50 kv d-c rectifier with a control to correct for line voltage variation. The beam is normally blocked by a target. An impulse synchronized with the phenomena will trip the relay which bends the beam around the target so that it will strike the fluorescent screen or film below.

The new streamlined unit consists of the oscillograph proper in front of the cabinet and the cabinet proper which houses all energizing and control circuits. Energizing terminals are enclosed except one bushing connected to the source of synchronizing impulse. Concentrating coils, beam current meter, and leak valve, control the intensity and size of the trace on the film. Deflecting coils move the zero position of the beam so as to use the whole area of the exposed film for the record.

In addition to the fluorescent screen for direct observation, the instrument contains a stationary film holder taking a standard film for recording electrical phenomena lasting 1/1000 of a second or less, and may be operated with a rotating film drum for phenomena lasting from 1/1000 to 1/10 of a second. A photoelectric control which makes it possible to take an oscillogram in one revolution of the drum, regardless of speed, eliminates the possibility of superimposed waves.

Further information on the electronic oscillograph may be secured from P.O. Box 868, Westinghouse Electric and Manufacturing Company, Pittsburgh 30, Pa.

Simple Filtration Process Produces Chemical Equivalent of Distilled Water

Ordinary water can now be transformed into the chemical equivalent of distilled water by a simple filtraiton process developed by American Cyanamid and Chemical Corporation and made available in portable and stationary equipment designed for all types of users.

With these units, trade-marked Filt-R-Stil, water which is virtually mineral-free is made readily accessible for research laboratories; in electronic and electrolytic equipment fabrication; in the manufacture of textiles, leather, paper, pharmaceuticals, food, dyestuffs, and many other products, as well as in the filling of storage batteries.

The principle of the Filt-R-Stil is one of filtration by skillful utilization of melamine-derived and other resins, developed by the American Cyanamid Company. Water is passed through beds of these ion exchange resins which transform the dissolved salts in the water to the corresponding acids and in turn absorb the acids. The process may be visualized by picturing water as containing flowing metals which are attracted by a magnet except that the magnet, in this case, is chemical rather than electrical.

The final demineralized water has an average salts content as low as two parts per million as calcium carbonate, and has been produced as pure as one-half part per million. The process also removes dissolved carbon dioxide from the water, a feature of particular importance in its use in the electronic and electrical fields. So effectively has water been cleaned of its minerals that its specific resistance to an electric current has been increased to as much as 6,000,000 ohms, which compares with a resistance of 50,000 ohms previously considered to be very good.

The Filt-R-Stil is made in different sizes and capacities to meet various requirements. The small portable unit is made in two forms, one for field and the other for bench use. The field unit, designed primarily for use by the Armed Forces, supplies demineralized water for storage batteries and for electronic equipment where water free of dissolved salts is essential to make it a perfect insulating medium. The bench unit is designed for use in filling stations, drug stores, photographic studios, chemical laboratories, and similar applications.

The capacity of these small units is eight to ten gallons of demineralized water per hour. They are equipped with cartridges of ion exchange resins, which are renewable when exhausted, in much the same way as flashlight batteries are renewed. An automatic shut-off or warning device on each unit indicates when renewal of the cartridge is necessary.

The Filt-R-Stil Lab unit has a capacity of approximately thirty gallons per hour. It is designed for the larger chemical and research laboratories, hospitals, and other users where moderately large quantities of demineralized water are needed. The operation of the laboratory unit differs somewhat from that of the portable unit. In place of a cartridge, there are four beds of alternate cation and anion exchange resins in pyrex glass columns connected by an intricate piping system. As the water passes over the first bed, dissolved

salts are transformed to the corresponding acids. These acids are absorbed on the second bed. The third bed picks up any dissolved salts which have leaked through and the fourth absorbs the remaining acids as well as removing the carbon dioxide.

In addition to these units, the Filt-R-Stil is also made in special sizes for large industrial users. Boiler plants, oil refineries, synthetic rubber plants, textile mills, etc. can thus obtain a continuous supply of thousands of gallons of demineralized water and other liquids can be handled in production volume for improved process developments as, for instance, in the sugar and chemical industries.

Both the Lab unit and the large, permanently installed units are equipped with a system for the reactivation of the ion exchange resins, which thus can be used over and over again. These units are also equipped with electronic controls, operating on resistant circuit in the water which indicate when the effluent water is mineral-free and or when the quality is below standard and regeneration is thus required.

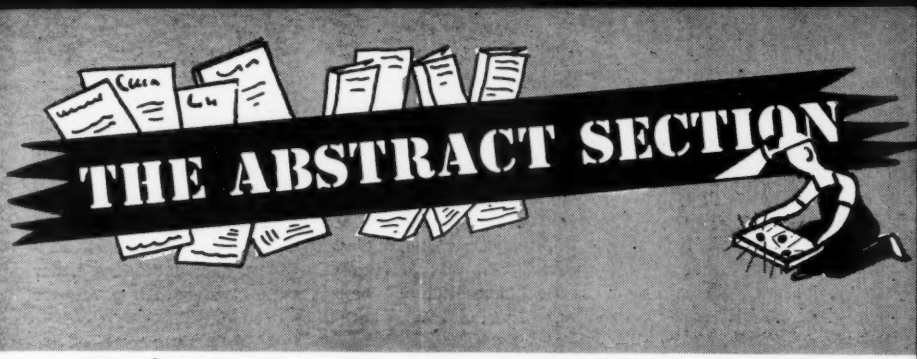
Filt-R-Stil units are numbered among the recent new developments emanating from extensive research by the American Cyanamid Company in resins derived from the chemical, melamine, which the company commercially developed.

Duracite Alkali-and-Acid-Resistant Cement

Duracite — a synthetic resin cement based on the Duralon series of synthetic resins — is characterized by extreme density, high compressive and tensile strength, and excellent resistance to acids, alkalies, hydrocarbons and solvents. It can be used as a mortar for acid-proof masonry in tank linings, floors, sewers, towers, and for other installations handling alternately acids and alkalies. It is recommended for use up to a temperature of 350° F although Duracite has proven satisfactory in some instances at temperatures as high as 375° F.

Duracite comes in the form of a liquid and powder, and unlike synthetic cements of the phenolic type, can be stored indefinitely before mixing without deterioration. Duracite is 100% resin with no solvents added. Viscosity of the Duracite solution is thus absolutely uniform, assuring uniform mixing, uniform results. Duracite sets quickly, by internal chemical reaction. Setting time can be easily controlled to suit the requirements of the individual job, however, normal setting time permits continuous laying of brick. Duracite is tough, durable, easy to use. It is highly resistant to abrasion, to impact shock, and to rapid changes in temperature. For further information write the U. S. Stoneware Co., Akron, Ohio.

Happy New Year



Inspection Tests for the Adhesion of Electroplated Coatings with Particular Reference to the B. N. F. Adhesion Test. By A. W. HOTHERSALL and C. J. LEADBEATER. *Journal of the Electrodepositors' Technical Society* 1944, **19,** 49-62.

Three different adhesion tests described. Best is B.N.F. Adhesion Test; plated surface is bombarded by a ball-ended hammer, which is actuated by a fluctuating magnetic field; non-adherent or very slightly adherent plate is blistered; method is applicable on hard or soft plate or base metal; may also be useful on other coatings, metallic and non-metallic; apparatus patented. Shot impingement test is effective, but limited in scope; plated surface is bombarded by iron or steel shot of .065" diam., either falling by gravity or blown by low pressure air. The electrolytic test is limited in application to coatings permeable to hydrogen; plated parts are cathodically treated in 5% sulfuric acid, which causes weakly adherent plate to blister.

L. B. SPERRY

Studies on Brass Plating. By S. G. CLARKE, W. N. BRADSHAW, and E. E. LONGHURST. *Journal of the Electrodepositors' Technical Society* 1944, **19,** 63-89.

A study of brass plating has been made, with particular reference to the changes in color of deposit and cathode efficiency caused by variation in pH, temperature, cathode current density, and concentrations of copper, zinc, free cyanide, and ammonia; curves have been plotted from data obtained. Monoethanolamine was successfully used as a non-volatile substitute for ammonia. Analysis methods for brass solutions are given, including a new method for ammonia.

L. B. SPERRY

Rapid Silver Plating. By R. A. SCHAEFER and J. B. MOHLER. Trans. American Electro Platers Society.

A new high pH cyanide silver bath has been developed for the rapid electrodeposition of silver at a cathode current density of approximately 100 amperes per square foot. A bath which will give a dense ductile deposit under rapid plating conditions is as follows:

Silver cyanide 40-43 grams per liter
Free Potassium Cyanide 38-42 grams per liter
Potassium Hydroxide 8-14 grams per liter
Potassium Carbonate 45-80 grams per liter
Temperature 42°-45° C.

Low chemical consumption was reported to be a feature of this bath.

Cast silver anodes 99.9% pure were used and the solution was found to be less sensitive to anode impurities than the conventional silver plating bath.

R. B. KINNAMAN

Electro Tinning and Detinning of Steel Sheet. By JOSEPH TEINDL. *Hornicky Vestnik* **23,** 95-7 (1941); *Chem. Zentr.* **1942, 1,** 2192.

Clean and smooth steel sheet is necessary to produce bright Sn coatings. Commercial methods for hot and electrolytic tinning are described. Electrotinning has no loss of Sn by oxidation, is more economical, and can produce a sheet having 30 g. of Sn/sq. m. on one side and 5 g./sq. m. on the other, whereas 40 g./sq. m. on each side is given by hot tinning. Sheet having approx. 3 g./sq. m. of Sn is satisfactory for lacquering. Porosity in Sn coatings cannot be eliminated by either method. Sheet for use in food cans should have not more than 3 to 5 pores per sq. cm. although up to 17 have been allowed.

W. A. MUDGE,
Chemical Abstracts

X-ray Studies of Electrodeposits of Copper. By G. P. MAITAK. *Zapiski Inst. Khim. Akad. Nauk* U. R. S. R. **7,** 527-50 (1941); *Chem. Zentr.* **1942, 1,** 3176.

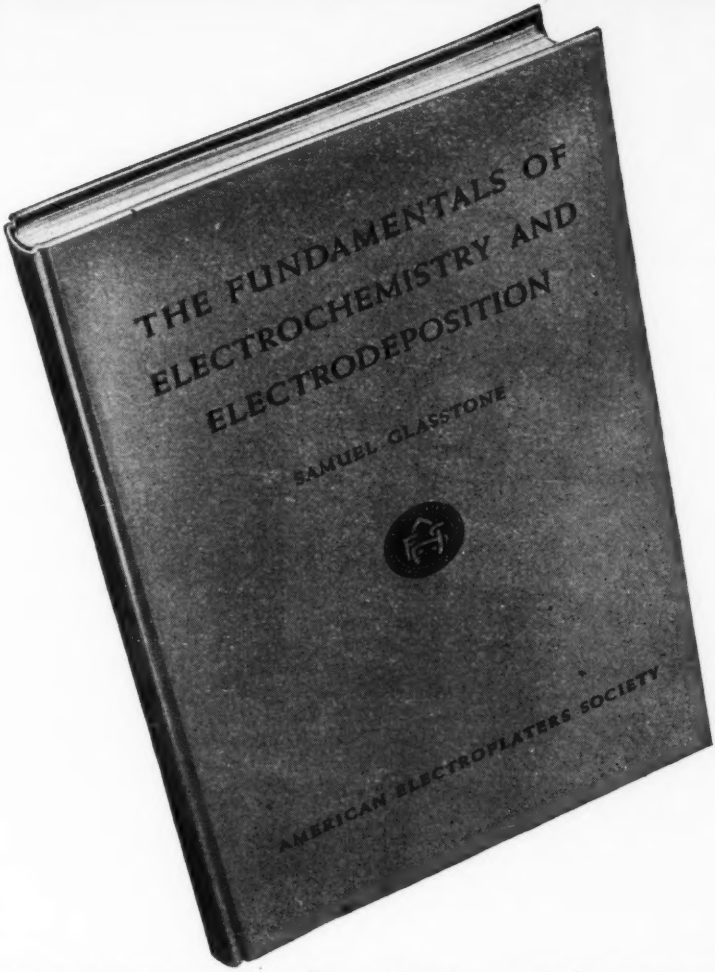
The Cu electrodeposits were obtained at various c. ds. from *N* $CuSO_4$ solution and from *N* $CuSO_4$ + *N* H_2SO_4 solution. At c.d. 0.05 amp./sq. cm. the parameter of the lattice was 3.610 A. which checks with the value obtained electrochemically. At 0.05 to 0.025 amp./sq. cm. deposits from either solution gave the highest overvoltage. At c.d. higher than 0.05 amp./sq. cm., spongy deposits were obtained which had larger lattice parameters. At 0.6 amp./sq. cm. the parameter reached a maximum. At the very start of Cu-sponge deposition the same parameter was obtained at 0.6 amp./sq. cm. (and the same overvoltage) as at 0.05 amp./sq. cm. In some of the spongy deposits the x-ray revealed the presence of Cu_2O. The size of the primary particle was 200 A., no matter whether the deposit was solid or spongy. **Hydrogen Overvoltage of Various Electrolytic Copper Deposits.** *Ibid.* The electrolyte used was *N* $CuSO_4$ in *N* H_2SO_4: The c.d. varied from 0.001 to 1.0 amp./sq. cm. At 0.1 amp./sq. cm. the overvoltage (o.v.) was 0.64 to 0.66 v. The lowest 0.v. obtained was for spongy deposits at 0.6 amp./sq. cm.

C. G. FINK,
Chemical Abstracts

Bonding Metal Particles by Heat Alone Without Pressure. By LAURENCE DELISLE. Electrochemical Society—Preprint 85-16 for meeting of April 13-15, 1944, p. 171-187.

This report incorporates the results of microscopic examination and a few physical tests of specimens made of metal powder by sintering in hydrogen for three hours at various temperatures. Powders of different particle shape and size were filled into boats without application of any pressure. Iron, copper, and silver powders were investigated. It was found that the particle size is a very important factor on the extent to which bonding between particles proceeds and on the density of the sintered specimens. For the particle sizes studied ranging from a few microns to 1 mm. in diameter, the finer the particle size, the better the bond and the denser the specimen. The effect of particle size on the temperature at which bonding starts could not be established. Cold working of the powder seems to lower the temperature at which bonding starts. The addition of small percentages of graphite to electrolytic iron seems to lower the temperature at which bonding starts. The particle shape has an effect on the extent to which bonding proceeds. However, the number of experiments performed on the effect of cold working, on the addition of graphite to electrolytic iron and on particle shape, was not sufficient to warrant definite statements.

FRANK K. SAVAGE, VINCENT MATTACOTTI



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GERMAN BOOKS REPUBLISHED IN THE UNITED STATES

As an aid to American scientists and industrial technicians, during the war the Alien Property Custodian has licensed various American publishers to republish many of the more valuable German and other foreign technical books. Most of the books of an electrochemical or electrometallurgical interest are being republished by Edwards Brothers, Inc. of Ann Arbor, Michigan. Importation of the originals will be illegal for five years, so it appeared worthwhile to list some of the books available now for the benefit of anyone interested. A complete catalog of all of the books available may be obtained from Edwards Brothers, Inc. It is the more important to be familiar with this source of technical information if one can read German, as it is understood that the German book publishing industry has been largely destroyed by bombing.

Some of the books available now are as follows:

1. V. Engelhardt, editor, "Handbuch der Technischen Elektrochemie," 6 volumes, 1931-1934, Price per set ..... $ 79.00
   Volume I, Part 1, 613 pages, 1931, "Technische Elektrometallurgie." (Includes general chapters and those on Iron, Manganese and Chromium, Nickel, Cobalt-Zinc-Cadmium, Bismuth-Antimony-Lead-Mercury, and Tin ..... $ 20.50
   Volume I, Part 2, 331 pages, 1932. (Includes Gold-Silver, Copper, Copper, and Miscellaneous Metals ..... $ 12.00
   Volume I, Part 3, 448 pages, 1933. (Comprises "Galvanotechnik" by G. Elssner, an outstanding advanced textbook of Electroplating). $ 16.50
   Volume I Set ..... $ 40.00
   Volume II, Part 1, 451 pages, 1933, "Die Technische Elektrolyse wasseriger Losungen. Anwendungen in der chemischen Industrie." (Inorganic Part.) ..... $ 16.50
   Volume II, Part 2, 328 pages, 1933, (Inorganic Part continued and Organic Part.) ..... $ 10.75
   Volume II Set ..... $ 23.00
   Volume III, 565 pages, 1934, "Die Technische Elektrolyse im Schmelzfluss." ..... $ 15.50
2. R. Muller, "Elektrometallurgie," 580 pages, 1932. (A very excellent and complete textbook of the electrodeposition of all metals for different purposes, such as electrolytic refining or extraction, and electroplating.) ..... $ 11.00
3. R. Muller, "Elektrochemie nicht-metallischer Stoffe," 440 pages, 1937. (Electrolytic production of hydrogen and oxygen, alkali and chlorine, electrolytic reduction and oxidation, electrophoresis, etc.) $ 11.75
4. F. Ritter, "Korrosionstabellen metallischer Werkstoffe, geordnet nach angreifenden Stoffen," 192 pages, 1937. (Excellent reference tables to find the best metals or alloys to resist any given corrosive solution or chemical.) ..... $ 5.00
5. A. Guntherschulze and H. Betz, "Elektrolyt-Kondensatoren," 178 pages, 1937. (Electrolytic Condensers, including also abstracts of

all German and some U. S. patents.) ..... $ 6.00

6. P. Drossbach, "Elektrochemie geschmolzener Salze," 143 pages, 1938. ..... $ 4.45

7. O. Vogel, "Handbuch der Metallbeizerei. Nichteisenmetalle," 262 pages, 1938. (This is a very good textbook of the pickling of nonferrous metals, and is very welcome since there are almost no worthwhile books on metal pickling. The second part of this book on the pickling of iron and steel appeared in Germany recently, and it is to be hoped that Edwards Brothers will republish it also.) ..... $ 10.50

8. O. Bauer, O. Krohnke and G. Masing, editors, "Die Korrosion metallischer Werkstoffe," 1936-1940, 3 volumes ..... $ 49.75
Volume I, "Die Korrosion des Eisens und seiner Legierungen," 560 pages, 1936 ..... $ 13.65
Volume II, "Die Korrosion von Nichteisenmetallen und deren Legierungen," 901 pages, 1937-1938. ..... $ 22.50
Volume III, "Der Korrosionschutz metallischer Werkstoffe und ihrer Legierungen," 615 pages, 1940. (This volume on "Protection From Corrosion" by means of both organic and inorganic coatings as well as metallic coatings, has appeared during the war and is of unusual interest. It includes a chapter about 100 pages long on "Electrodeposits" by M. Schlotter ..... $ 14.50

Some additional books being republished by Edwards Brothers at the present time, or which they expect to make available in a few months, are:

9. H. Hohn, "Chemische Analysen mit dem Polarographen," 102 pages, 1937. ..... $ 3.00

10. K. E. Schwarz, "Elektrolytische Wanderung in flussigen und festen Metallen," 95 pages, 1940. ..... $ 3.50

11. J. Heyrovsky, "Polarographie," 514 pages, 1941. ..... $ 14.00

12. G. Kortum, "Elektrolytlosungen," 483 pages, 1941 ..... $ 9.75

13. E. Muller, "Die elektrometrische (potentiometrische) Massanalyse," 6th edition, 296 pages, 1942. ..... $ 5.50

14. G. Schikorr, "Die Zersetzungserscheinungen der metalle. Eine Einfuhrung in die Korrosion der Metalle," 232 pages, 1943. ..... $ 6.50

15. W. Machu, "Metallische Uberzuge," 2nd Edition, 643 pages, 1943 (American workers had no opportunity to purchase the first edition of this book published in 1941. In view of many worthwhile articles published by Machu, this should be a valuable book. It is probably comparable to the A.C.S. Mongraphs on "Protective Metallic Coatings" published by Rawdon and by Burns and Schuh.) ..... $ 20.00

It seems quite a noteworthy achievement that Edwards Brothers, Inc. should make these books available during the war, and it was thought advantageous to give a rather complete listing of books of an electrochemical nature in a single issue of the *Review* for reference purposes. Those interested should obtain Edwards Brothers complete catalog as several hundred or more other foreign books on special subjects have been or are being republished. The above books may be ordered either directly from Edwards Brothers or through the New York Office of the A. E. S.

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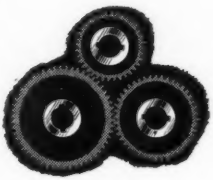

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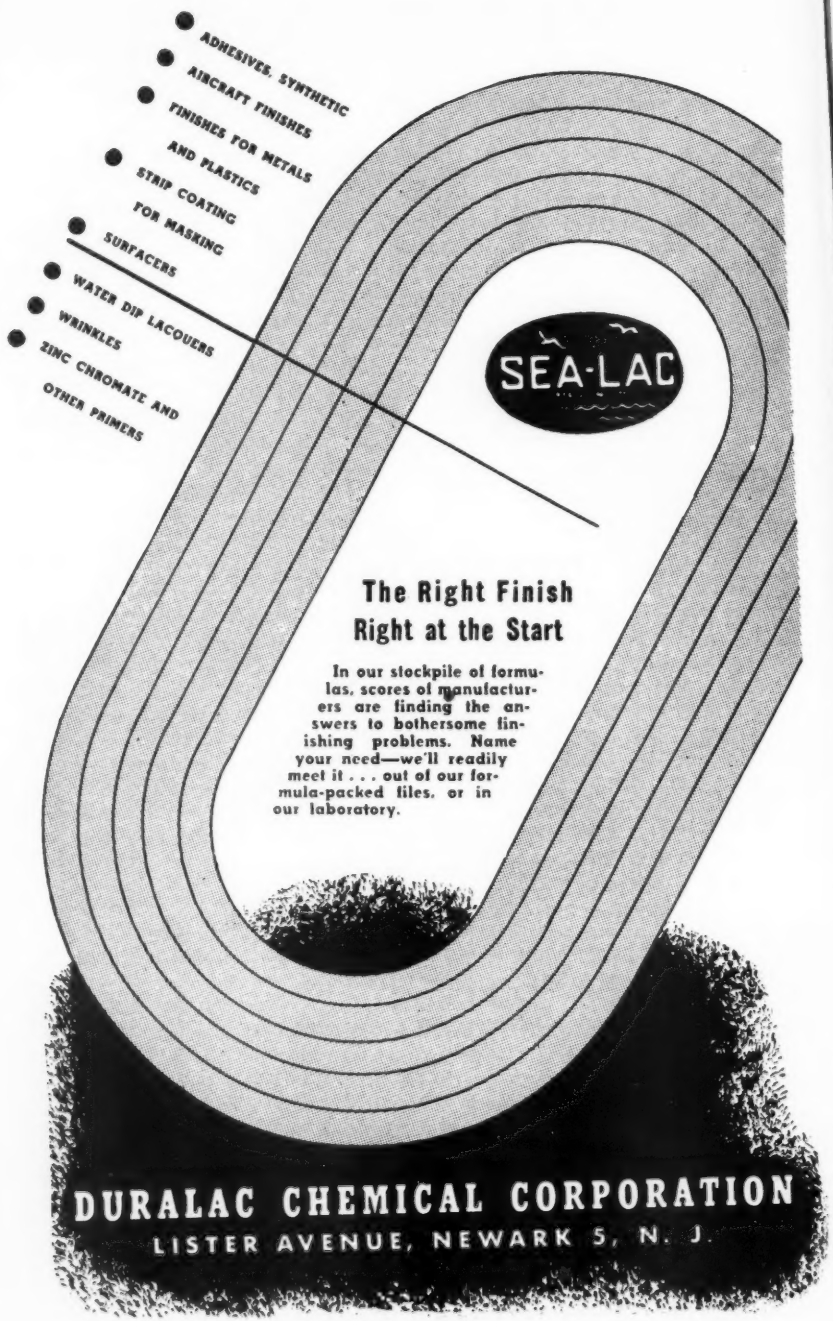
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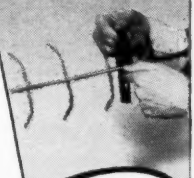

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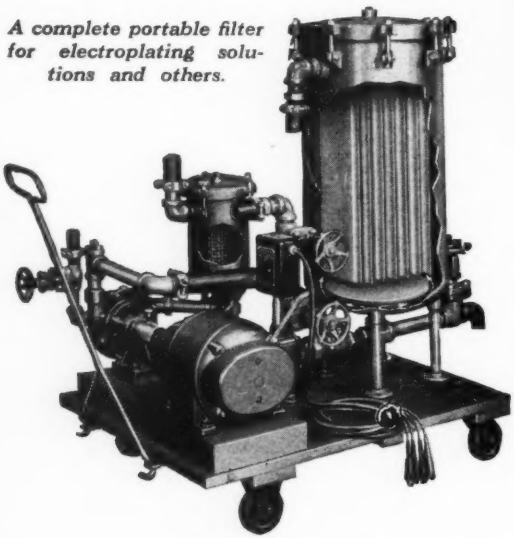

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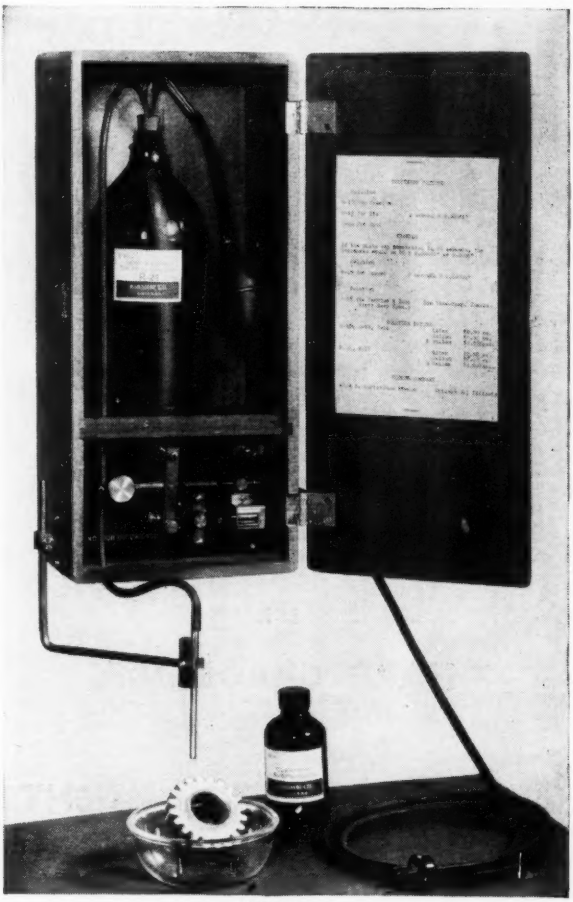

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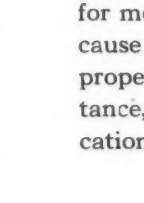

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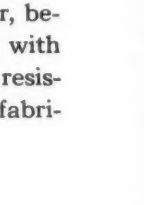

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BRANCH NEWS

INDIANAPOLIS BRANCH

The Indianapolis Branch of the American Electroplaters' Society held its regular monthly meeting November 1, 1944 at the Hotel Riley. The meeting was called to order at 8:30 P.M. by our president, Mr. A. L. Chesterfield and was attended by 51 members and friends.

The meeting consisted of routine business, report by committee on Fall Festival, election of members, and two excellent talks; one by Mr. G. S. Krentel of MacDermid, Inc., and the other talk was by Mr. J. M. Cosgrove of the Lucas Harold Corp., Indianapolis, Indiana.

The two newly elected associate members of the Indianapolis Branch are George Swain Morrison and Robert William Lancing.

Mr. G. S. Krentel, the first speaker of the evening used for his subject, "Review of Literature on Electrolytic Polishing." He discussed the work that had been done on electrolytic polishing, patents granted, types of baths commonly used and the advantages and disadvantages of the various baths. Mr. Krentel concluded his address by telling us of what he thought to be the limitations of electrolytic polishing, maximum roughnesses tolerable and where the baths might be used to an advantage.

Mr. Cosgrove used as his subject "Measurement and Designation of Surface Finishes." He went into detail to explain the nature, roughness, types, derivation of equations of surface finishes and how the mathematical equations were used in relation to a surface measurement machine (surface analyzer). Numerous slides were used to illustrate different types of surfaces and to show how certain mathematical relationships and constants were derived. Mr. Cosgrove concluded his talk by describing a Surface Analyzer exhibited and demonstrated at the meeting by the Brush Development Company of Cleveland, Ohio.

Several questions were asked Mr. Krentel and Mr. Cosgrove upon completion of Mr. Cosgrove's talk. The meeting was adjourned at 10:30 P.M.

CARL R. MORRIS, *Secretary-Treasurer*

BOSTON BRANCH

Boston Branch met Thursday, December 7th at the Statler Hotel, Boston with President Swift in the chair.

Communications read and placed on file, bills read and ordered paid.

Boston Branch will celebrate its 25th anniversary with a banquet to be held Saturday, March 3rd at the Statler Hotel, Boston. This will be as good as the Boston convention show, so all the members and their friends can look for the best time they ever had.

The following applications were read and turned over to the Board of Managers for approval: Alfred L. Goddard, 16 Tyler Park, Lowell, Mass., active; Alexander Ruddock, Dept. 404-2, Tube Bldg., Raythoen Mfg. Co., Waltham, Mass., active; Elliot Charney, P.O. Box 397. Church St. Annex, New York City 8, N. Y., Room 1162, associate; John H. Mengel, 11 Mansfield St., Everett, Mass., associate; James G. Bellino, 118 Suffolk Ave., Revere, Mass., associate; Salvatore Franco, 7 Chesterton St., Roxbury 19, Mass., active; Arthur Gilbert, 122 High St. Somersworth, N. H., associate; Emmerson H. Newton, 82 Edgemoor Ave., Wellesley, Mass., associate; Ingwell M. Johnson, 84 Oak St., East Natick, Mass., active; and George Heeney was reinstated. Will have his address at the next meeting.

The speaker for this meeting was Dr. F. R. Morral, American Cyanamid Chemical Corp. His subject was "Effects of Impurities in Water on Electroplating Solutions." He gave an interesting talk and showed slides of different tests of waters in other parts of the country, he answered all questions for the members and was given a rising vote of thanks for his interesting talk.

Meeting adjourned at 10:30 P.M.

A. W. GARRETT, *Secretary-Treasurer*

MONTREAL BRANCH

The meeting of the Montreal Branch A.E.S. was held at the Mount Royal Hotel on Monday, November 6, 1944 and was called to order at 8:45 P.M. by Mr. J. T. Reisenburg, our chairman. A slight improvement in attendance was noted in the past two meetings; it is to be hoped that this continues.

Under unfinished business Mr. Candee's answer to our letter inquiring into the practice of papers presented at our convention being published in outside publications was read and it was moved that the answer be acknowledged and filed.

Mr. J. H. Feeley reported that due to the discussion caused by the inquiry of Montreal Branch as to the constitutionality of the membership certificates it has been decided to have these issued bearing a stamped expiration date.

Membership report committee:

Mr. Roland Dube of Warren Industries, Ltd., Montreal be admitted to Associate membership; moved by Mr. W. Gauvin, seconded by Mr. H. Jordon.

Letters read:

Letter from Research Committee, re. financial contributions to the research fund; this letter was turned over to Mr. Feeley for a further report.

Letter from Mr. J. Bain re. *Monthly Review*, this letter noted and filed.

Letter from Cleveland re. convention financial report; this was read and it was moved that this be filed for future reference.

Mr. Reisenburg introduced the speaker for the evening in the person of Mr. H. S. Jordon of the Canadian Marconi Co., Ltd., Montreal. Mr. Jordon's subject was "Control of Plating Solutions by Analysis." The speaker showed that the analysis of plating solutions need not be difficult nor require expensive laboratory apparatus. He showed very clearly on the blackboard that with the purchase of a standard n/10 Ag NO_3 all other standards necessary for the analysis of the Cyanides, Caustics or Hydroxides, Chlorides in a Nickel Solution, and Metalic Cd. in a Cadmium plating solution, can be prepared. The members present asked innumerable questions which the speaker seemed to enjoy answering and Mr. Jordon has promised to repeat this lecture when his present series of experiments are concluded.

WILLIAM G. FINLAY, *Secretary-Treasurer*

NEWARK BRANCH

The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, November 17th, at the Hotel Robert Treat in Newark, N. J. The meeting was called to order at 8:30 P.M. with President Robert R. Sizelove presiding. All other officers were present.

The minutes of the previous meeting were read and approved.

A communication from Rochester Branch thanking Newark Branch for the Year Books was read and placed on file.

A communication from Dr. Skowronski, Chairman of the American Society for Metals, calling an organization meeting for the proposed Technical Societies Council of New Jersey on December 4th at the Essex House, was read and our President asked Mr. Smith and Mr. Wagner to attend that meeting.

Application for Seymour B. Lonyai, Eclipse-Pioneer Division of Bendix Aviation Corp., to Associate Membership was voted to take the regular course.

The resignation of John W. Varick of Sperry Gyroscope Corp. was accepted.

The guest speaker for the evening was one of our old Newark Branch members who is now in Binghamton with the Brewer-Tichenor Co. His subject was "Hard Chromium Plating." Mr. Austin Fletcher exhibited numerous samples of tools, reamers, drills and dies which were hard chromium plated in a solution containing 33 to 40 ozs. of Chromic Acid and Zinc Sulphate, the ratio being 75 to 1. He stated that coatings of .0001 to .0002 of Chromium on cutting tools, drills and reamers would increase the life of the tool anywhere from 500 to 1000 per cent and if care is taken the tools can be stripped and replated over and over again, gaining that same percentage each time. He also stated that tools should be heat treated before and after plating for maximum efficiency. After his talk, he was bombarded by questions which he answered to the best of his ability. He was given a rising vote of thanks by the 68 members who attended.

Meeting was adjourned at 11:15 P.M.

GEORGE WAGNER, *Secretary*

NEW HAVEN BRANCH

The regular monthly meeting of the New Haven Branch was held on Tues-

day evening, November 14, 1944, in the Hotel Taft.

President Walter T. Lynch presided and welcomed one of the largest groups of the year. The Secretary read an appeal from Jack Bain regarding advertisements in the *Review*. A letter from the Regional Committee was read and Bob Mooney moved that it be left to the discretion of our President, Walter T. Lynch. George Knecht, Chairman of our Membership Committee, being in Cleveland, could not attend but requested the support of all the members in the drive for new applicants.

Our President then introduced a very popular speaker at the New Haven Branch, Myron B. Diggin, Chief Chemist Hanson-Van Winkle-Munning Co., who spoke on a new ternary alloy plate of Copper, Tin and Zinc. This alloy plate of which the anodes are the same composition as the deposit, keeps the metal content of the bath constant. The alloy plate is bright blue-white in color, resistant to varnish, ductile with good wear resistance, and can be soldered. The bath has good throwing power and claims many advantages over other alloy solutions.

Mr. Diggin showed various samples of his work and answered many questions asked by the members. Many details were brought out by the well-placed questions of Mr. Henry J. Creamer and Dr. Walter R. Meyer. A general discussion on the merits of this procedure continued after giving Mr. Diggin a rising vote of thanks.

The meeting adjourned at 11:30 p.m.

B. J. GAFFNEY, *Secretary*

NEW YORK BRANCH

The regular meeting of the New York Branch was held on December 8, and was opened by President Martin Maher at 8:30 P.M.

Michael W. Brand and Charles Fredricks were elected into the branch.

New applications were received from Fredric H. Hesch and Joseph Isaacs.

Invitation to attend the Newark Branch Christmas party on Saturday, December 16, was then read to the branch.

Mr. Maher then introduced past national President Fred Fulforth, of the United Chrome Corp., who spoke on "Porous Chrome." The talk was well received and a rising vote of thanks was rendered Mr. Fulforth.

The meeting was adjourned at 10:30 P.M. after which the Annual Christmas Social was held. New York Branch wishes to express its sincere wishes for a Merry Christmas and a Happy New Year to all its sister branches.

GEORGE SCHORE.

The New York Branch held its open meeting at the Hotel Pennsylvania, November 24, President Martin Maher presiding.

Louis Schwartz was voted into the branch as an active member. New applications were those of John D. Palermo, John Melhado and Michael W. Brand.

Communication from the Philadelphia Branch, inviting the membership to a testimonial dinner being given to George Gehling on December 8, was read.

Librarian Ed Reinker, then took the chair and introduced Mr. Melton Nadel, a member of the New York Branch and speaker of the evening. Mr. Nadel presented an excellent and instructive talk on "Lead-Tin Alloy Plating." The talk was well received and the speaker was given a rising vote of thanks.

Meeting adjourned at 10:30 P.M.

GEORGE SCHORE.

PHILADELPHIA BRANCH

President Zurbach called the Philadelphia Branch A.E.S. meeting to order the fourth Friday of November.

The minutes of the previous meeting were approved as read.

The applications of Vincent Casswell and James E. Pugh, associates, were referred to the Board of Managers.

The communications were read and ordered received and filed.

The Board of Managers approved the applications of Louis Thaler and Julius Kronrad, associates, and they were elected to membership.

Motion — the Librarian requested $30.00 for use in building up the Electroplaters section in the Logan Free Library of Philadelphia, at 19th St. and the Parkway. Carried.

The bills were ordered paid.

President Zurbach turned the gavel over to Librarian Hirsch, who introduced the speaker of the evening, Floyd F. Oplinger of the Dupont Co. of Wilmington, Del., whose subject was "High Speed Copper."

Mr. Oplinger spoke long and interesting on the changes from Sodium Cyanide and Hyroxide to Potassium Cyanide and Hydroxide; also noting the various benefits derived from the change.

The speaker paused time and again

to answer the various questions and comments.

The meeting closed with a rising vote of thanks to Mr. Oplinger for a most interesting and educational session.

PAUL MENTZER, SR., *Secretary*

ROCHESTER BRANCH

The Rochester Branch of the American Electroplaters' Society held the regular monthly meeting Friday, November 17, 1944 at the Hotel Seneca.

The meeting was called to order at 8 P.M. by our President, Mr. John Q. Adams.

All business was dispensed with for this meeting to give our speaker ample time to present his paper.

Mr. William Tucker, Librarian, introduced our speaker for the evening Mr. Arthur Logozzo of MacDermid, Inc. Mr. Logozzo gave his paper on hard chrome as presented to the Cleveland convention. He spoke on causes of cracking, selection of etching medium and time, cycle for small tools non-ferrous cycle, stripping of chrome plate, demagnetizing essential, solution difficulties, agitation and discussion of racks including anode and cathode positioning. Questions were asked from the floor and Mr. Logozzo answered as many as time permitted. All present then gave Mr. Logozzo a rising vote of thanks. This was an unusually interesting and educational session and we had a grand turn out with about 75 present.

Meeting adjourned at 10:30.

DONALD C. BLUM, *Secretary*

SPRINGFIELD BRANCH

The October meeting of the Springfield Branch of the American Electroplaters' Society was held October 23, 1944 at the Hotel Charles, Springfield, Mass. The meeting was called to order at 8:15 P.M. by President Hastie. The minutes of the September meeting were read and approved.

Daniel J. Clini, 30 Belmont Ave., Springfield, Mass. was elected an associate member.

A letter was read from C. E. Heussner relative to contributions to the Research Fund. It was voted not to take any action until further explanation is given by Mr. Candee. A letter from Jack Bain, Business Manager of *The Monthly Review*, was read and noted by the members.

The resignation of J. A. Morin was accepted with the provision that he be advised that he has the option of transfer to Newark if he so desires.

The members voted that the Secretary-Treasurer of the branch should be exempt from the payment of dues and that this action be retroactive to cover the term of office of the previous Secretary-Treasurer.

Mr. John Costigan gave a report on the proposed establishment of a regional convention fund of $1000 to underwrite future regional conventions. It was voted to refer action on this to the Board of Managers.

Mr. Frank Clark suggested that separate business meetings be held. After some discussion it was voted to table this until the next meeting.

President Hastie then introduced Dr. Henry L. Kellner of the Lea Manufacturing Co., Waterbury, Conn. Dr. Kellner first presented movies of the 1944 Cleveland Conference. Following this Dr. Kellner gave a condensed version of a soon to be published paper on "The Finishing of Plastic Articles." The speaker gave a very interesting presentation of the similarities and differences in the finishing of plastics as compared with the finishing of metals. Dr. Kellner was given a rising vote of thanks. Meeting adjourned at 10 P.M.

PAUL F. LYMAN, *Secretary-Treasurer*

TOLEDO BRANCH

A regular meeting of the Toledo Branch of the A.E.S. was held in the office of the Victor Miner Co., Toledo, Ohio, on the evening of Nov. 2, 1944.

The meeting was called to order by the president at 8:30 with twenty members present.

Minutes of the previous meeting were approved as read.

Mr. Vannorsdall gave a report of the research committee.

After a lengthy discussion, Mr. Gerity moved that the Toledo Branch oppose any assessments to the membership for research purposes, but that they should be solicited from the firms in the plating field, who after all get the direct benefit from the research work; this motion was seconded by Mr. Walter Wieker and passed.

On motion by Mr. Vannorsdall which was seconded by Mr. Phillips, the following applications for membership in the Toledo Branch were accepted.

Jess Manges, Bluffton, Ohio, Active, Foreman Plater at Triplett Electric Co., Plant No. 2.

Glenn Noe, Bluffton, Ohio, Associate. Engineer and Chief Draftsman at the Triplett Electric Co.

Cleon Triplett, Bluffton, Ohio, Associate. Superintendent of the Triplett Electric Co.

James McKaig, Toledo, Ohio, Active. With the William Whitaker Co.

William Fair, Toledo, Ohio, Associate. With the Victor Miner Co.

Ronald Bechtel, Toledo, Ohio, Associate. With the Victor Miner Co.

Mr. Wieker suggested that the question box be used again.

Due to pressing business Mr. Marrow had to give up the job of Librarian and Mr. Vannorsdall was appointed acting Librarian. It was announced that at the next meeting a speaker would be available. The subject to be "Plating on Plastics" by Mr. Marx.

The meeting adjourned at 9:30 P.M.

G. BERGMAN, *Secretary*

CHICAGO BRANCH

The Chicago Branch held its monthly meeting on December 8th, 1944 with President R. J. Hazucha presiding.

Applications were received from W. U. Mercer, W. F. Bowler, B. F. Janetzke, and W. H. Armstrong.

F. Lavitas, H. M. Clain and J. Koley were elected to membership.

A research committee for the Chicago Branch is composed of: H. R. Smallman, C. Kocour, R. J. Hazucha, S. G. Krentel, C. M. Iwen, O. Weickmann, W. Kres, D. Stockton, C. Clindinin and M. H. Longfield.

A motion was made and passed to advance to the National Research fund an amount equal to one dollar per member of the Chicago Branch, and the dues be raised to $7.00 per year starting June 1, 1945.

J. W. Hanlon reported that the Banquet in January is not definite and the committee is working out a plan for the evening.

C. W. Carter reported that the Educational session will consist of three papers, to be given in the Club Building of the Palmer House.

Mr. Forrest L. Grim of Sturges Products Co. gave a short discription of "Roto Finishing as Related to Present and Post War Products," followed by the distribution of samples and discussion, which proved to be very interesting. A rising vote of thanks was given to Mr. Grim.

There were 66 in attendance and the meeting adjourned at 10:15 P. M.

M. H. LONGFIELD, *Secretary*

NEWARK BRANCH

The regular meeting of the Newark Branch, A.E.S., was held on Friday evening, December 1, 1944, at the Hotel Robert Treat in Newark, N. J. The meeting was called to order at 8:30 P.M. with President Robert R. Sizelove presiding. All other officers were present.

The minutes of the previous meeting were read and approved.

Communications from Aircraft Bolt & Rivet Company, Pasadena, Calif. and Pep Automatic Machine Company, Delawanna, N. J. were read and placed on file.

A communication from 2nd vice-president, Frank K. Savage with reference to the membership gain was read and the Secretary was instructed to answer this letter and inform Mr. Savage that the Newark membership record always shows an increase and never a decrease. ThTat the Branch is interested in quality rather than quantity and while the City does not rank third in population in the country, the Branch ranks third in membership.

Applications for George W. Jernstedt of Westinghouse Electric & Manufacturing Company and Anthony P. Niosi of Royal Chrome Anodizing Company to Active Membership, were voted to take the regular course.

Mr. Smith and Mr. Oldam reported that all details pertaining to our Christmas Party scheduled for December 16th, including the Floor Show, Orchestra and Buffet Lunch, had ben completed. Mr. Smith asked the members to please fill out the return postcards for reservations so that he could give the hotel some guarantee of about how many would attend.

The guest speaker of the evening was Dr. C. E. Mell of Darling Manufacturing Co., Williamsport, Pa. His subject was "Depositing Heavy Deposits of Rhodium." Dr. Mell was introduced by Librarian Edward Washburn. He gave a most interesting talk of how Rhodium was deposited up to about .001 of an inch in thickness or even more in some cases. Many of our members asked Dr. Mell for a copy of his paper and he promised to edit and rewrite the paper and send it to the Secretary for publication in the *Monthly Review*.

He was given a rising vote of thanks by the 49 members who attended this meeting.

Meeting adjourned at 11:15 P.M.

GEORGE WAGNER, *Secretary*

WATERBURY BRANCH

The December 8th meeting of Waterbury Branch was opened at the Hotel Elton promptly at 8:30 P.M. by President Maz with comments on the new form of the "Proceedings of the Society." The book form in which these papers have been issued is certainly a very great improvement and those who have instigated and directed this change are surely to be complimented. All members are urged to return the cards sent out by the *Review* with their comments and criticisms as this questionnaire will greatly aid in the publication of a magazine of greatest benefit to the organization.

A business meeting is to be held in Watertown at the home of E. W. Couch on Friday, December 29th. This will be a very important meeting and will be concerned principally with the discussion of Waterbury's part in the forthcoming regional meeting. It is hoped that the attendance will be large so that we may have all possible assistance in this project.

At this point Joe Thompson, our technical chairman of the evening, took over the program, presenting first Jack Hyner with the Monthly Book Review. Again this Review is actually concerned with one of the current papers, "Building Up Worn Parts by Electrodeposition," by Hothersall, published in "Iron Age" for November, 1944. This is a very excellent paper on the subject of heavy deposits, particularly in that it contains numerous valuable tables which are normally difficult to obtain. Bill Starr in his talk on priorities briefly summarized the opportunity and method in obtaining equipment for civilian production.

Mr. Raymond H. Wallace, New England manager of Paasche Airbrush Co., in his talk on "Automatic Production Spraying," emphasized the recent rapid advancement and refinements in automatic spray painting equipment. Equipment of this nature has speeded up production tremendously; however, in many cases where production is low it is of distinct advantage as it has many things to recommend it over manual spray painting. At the present time many government specifications require close tolerances on film thickness. In manual painting this thickness is entirely dependent on the discretion of each individual operator, while with automatic equipment the thickness is accurately controlled and uniformity is assured. Of course, where production is high, there is also a tremendous saving in labor and the work is completely finished in one cycle. Usually the floor space is considerably less for automatic equipment than for individual spray booths. One very great advantage is the ease in which equipment and surroundings are kept clean and, of course, what is very important, accurate control of finishing costs can be maintained. The standard spray painting unit is very flexible and can be adapted to many types of work. A detailed discussion of the equipment and the colored moving picture film which followed explained and illustrated the working of these machines in a manner understandable to every one. We are all indebted to Mr. Wallace for his clear and concise paper, and a truly appreciative audience gave him a rising vote of thanks at the finish of the discussion.

S. L. HENN, *Secretary*

LANCASTER BRANCH

The Lancaster Branch of the A.E.S. met this evening at Stevens Trade School at 8 o'clock P.M. There were 14 members present.

The Secretary read the various communications and an invitation from the York Branch of the A.S.M. to attend their December 13 meeting to hear Dr. Engels of the Colonial Alloys Co. speak on "Anodizing and Coloring of Aluminum."

After the business was concluded the librarian introduced Mr. L. M. Smith of the Weldon Roberts Rubber Co., who spoke on the "Application of Rubber Bonded Abrasive Wheels."

Mr. Smith described briefly the manufacture of rubber bonded abrasive wheels after which he listed the various advantages and disadvantages of the wheels. He then outlined their method of use and application to deburring and finishing. Samples of various materials finished with rubber bonded wheels were on display for the examination of the members. Samples of the thru grades of wheels were distributed to the members along with descriptive literature. The meeting closed at 10 o'clock P.M.

WILLIAM H. FORDNEY, *Secretary*

PHILADELPHIA BRANCH

December 8th, 1944, Philadelphia Branch met at a dinner meeting at the Broadwood Hotel, Broad and Wood Sts., Philadelphia, Pa. in honor of

George Gehling, Past Supreme President, Past Supreme Secretary, Honorary Member of the Supreme Society, and Honorary Member Philadelphia Branch with about 50 members and friends present.

President Zurbach called the meeting to order and a motion was made to suspend business for the evening and the gavel was turned over to the master of ceremony, Joseph E. Underwood.

Mr. Underwood called upon Philip Uhl, oldest member of the Branch, Past Supreme President, Honorary Member Supreme Society and Philadelphia Branch, and a charter member of the Branch, to say a few words (he is only 86 years young); also, Horace Smith, Past Supreme President and Member of Newark Branch, who told of the esteem of his branch.

The Master of Ceremony read the letters of regrets from the Supreme Society officers and Past Supreme President Wagner.

Mr. Underwood called upon various members of the Branch, who spoke quite feelingly of the good George Gehling has spread throughout the Society; those members were O. W. Mott, Al Hirsch, Barney Reynolds, Alex Robson, Walter Jenner, Art Snow, George Long, Nat Verrell, also Fred Gumm of Newark Branch.

"Joe" finally presented Philadelphia Branch's token of esteem to our "George" in the form of a purse of $100.00.

George Gehling responded in his usual manner, citing his appreciation of the gift and the fact, that it would be turned into U. S. War bonds immediately.

The Master of Ceremony turned the next proceedings over to Nat Verrell, chairman of the Entertainment Committee, who drew out of his hat a few acts of vaudeville.

The guest of honor, the visitors, and the members had quite an enjoyable time and broke up at a late hour.

The application of W. H. Trusdell, associate, was turned over to the Board of Managers.

The Board of Managers approved James E. Pugh and Vincent L. Casswell, associates, as members of the Branch.

PAUL MENTZER, SR., *Secretary*

PROVIDENCE-ATTLEBORO BRANCH

The December meeting of Providence-Attleboro Branch, was held at Curt Winters' Holiday Inn, South Attleboro, Mass.

The meeting was in the form of a pre-holiday party, and proved to be a most joyous affair, about seventy-five members and friends of the branch sat down to a splendid turkey and lobster dinner fixed in that good old New England style. Music for the dinner and entertainment that followed, was furnished by the Kiwanian Band, a superb musical organization known throughout the east for its high quality of performance. Due only to the fact that our own "Bill" Friemuth who was M.C., is a talented member of this fine band, were we privileged to have them on this gala occasion. The work of the trombonist and trumpeter ably assisted by the drummer, in feature numbers, will last long in the memory of those in attendance.

Perhaps the climax in solo entertainment came when "Tom" Smith of Hartford, and Oakite was presented by our Master of Ceremonies, we knew and we were pleased that he was in our midst, but what many of us did not know was, that he is just about the most pleasing entertainer we have heard in many a day. His work at the piano, and in song, brands him not only as a real "Head Liner," but a swell guy as well.

The committee in charge of this delightfully arranged event were, Branch President Jack Henry, Bill Friemuth whose work as M.C. proved him to be a natural, and good old Pete Lonsbury whose only claim to fame in the field of entertainment, is his almost uncanny ability to judge the quality and value of certain types of refreshment for which many of our group have a fondness.

You worked hard boys, but you did a swell job, and everyone is thankful.

C. C. CHASE, *Secretary*

HARTFORD BRANCH

The December dinner meeting of the Hartford Branch was held at the Hotel Garde in Hartford on Monday evening, December 11. Dinner was a little late being served, therefore the meeting did not get under way until 8:30. President Art Logozzo opened the meeting with a statement of congratulations to the 60 members and guests present for their fine attendance. Three new members were voted into the society and one transfer from the Bridgeport Branch was accepted.

The meeting was then turned over to the technical chairman, George Hogaboom who presented his regular monthly feature "Latest Developments in the Finishing Industry." George then introduced the speaker of the evening, Joe Sullivan, of the New Haven Clock Co. Joe's subject, "Hydrogen Embrittlement," was one which is pertinent to every plater, particularly in war times. Joe covered the subject well and showed slides to illustrate his points. He provoked much discussion and answered many questions, so that the meeting didn't break up until 10:45.

Art Logozzo called for a rising vote of thanks to Joe for his fine talk and expressed the desire to have him return again for another.

F. W. SMITH, *Secretary*

HARTFORD BRANCH

The November open dinner meeting of the Hartford Branch was held on Monday evening, November 20 in Jewel Hall at the Y.M.C.A. in Hartford. A fine roast beef dinner was enjoyed by about 20 members and guests. The educational session was opened at 8:15 P.M. by President Art Logozzo. Three new members were voted into the Hartford Branch and the applications of three more were accepted.

Ellsworth Candee, executive secretary was then introduced to the gathering. Mr. Candee spoke a few words regarding the research program and outlined the society's plan for obtaining funds for extended research.

Mr. Logozzo then turned the meeting over to Harry Sanders who acted as teachnical chairman for the evening. Mr. Sanders introduced George Hogaboom who presented the monthly feature, "Latest Developments in the Finishing Industry."

The speaker of the evening, Nathan Promisel of the Bureau of Naval Aeronautics in Washington was then presented. Mr. Promisel's informal talk on "Latest on Corrosion Problems" created a great deal of interest. The treatment of this subject by a man in his position provided the members and guests all they had anticipated.

Many questions followed Mr. Promisel's talk and Nate freely gave of his knowledge and advice in answer.

The meeting was adjourned at 10:30 with a rising vote of thanks to the speaker.

F. W. SMITH, *Secretary*

GRAND RAPIDS BRANCH

The Grand Rapids Branch held its second dinner meeting and the regular gathering of the Branch, December 8th at the Rowe Hotel. The second dinner meeting met with the approval of a large number and was well attended. An exceptional program was provided and the business was immediately opened by our President C. M. Fernekes promptly at 8 o'clock.

One new member was elected, Mr. Marvin Henry Swifink, 855 S. Otillia, S.E., Grand Rapids, Mich.

The following members were elected on the committees for the Seventh Annual Banquet, January 20th, 1945.

Entertainment — Stewart Martin, Chrysler Corp., 6700 Lynch Rd., Detroit 31, Mich.

Advertising — J. A. Badaluco, 1053 Veto, N.W., Grand Rapids 4, Mich.

Banquet Finance — Anthony Preston, 615 College, S.E., Grand Rapids 3, Mich.

Education—Kenneth Hampel, 138 Elwood St., Grandville, Mich.

Banquet Tickets — J. H. Seidel, 649 Lovett St., Grand Rapids 6, Mich.

These Committee appointees gave advance notice that this year's banquet would be larger and better, and advance work already in progress is ample proof of the success of this Branch Annual meeting.

All other business was disposed of in the usual manner and the final portion of the meeting was turned over to Dr. Walter Myer of the Enthone Company who spoke on "Cleaning, Plating and Chemical Treatments of Aluminum." Mr. Myer answered many questions concerning the treatment of aluminum and other metals involved, and this part of the program met with very interesting response from all present.

The films of last year's Cleveland Convention were shown at this meeting, along with the War Department film outlining the war production of armament in Germany.

The meeting was then adjourned.

C. E. ABEL, *Sec'y-Treas.*

BRIDGEPORT BRANCH

The regular monthly meeting of the

Bridgeport Branch of the American Electroplaters' Society was held Friday, December 1, 1944 at the Hotel Barnum. President A. R. McNeil opened the meeting at 8:30 P.M. with 25 members and guests present including John English from the New Haven Branch and H. M. Johnquest from the Waterbury Branch. It was also nice to see William Ehrencrona present at the meeting.

The roll call of officers was read and First Vice-President Herman C. Braun and Board of Managers R. J. O'Connor and Ben Kusterer were reported absent. The minutes of the previous meeting were read and accepted.

Reports of Special Committees:

No special committees appointed at this time.

Reports of Standing Committees:

Hubert M. Goldman, Second Vice-President and Chairman of the Membership Committee reported one application for membership with more prospects in view.

John Schneider of the Sick Committee reported no sickness at this time.

The Publicity Committee has no report to make at this time.

The Projector Committee reports that President A. R. McNeil has the projector now and any member wishing to use the machine should contact McNeil.

F. B. Gotthardt, Librarian and Chairman of the Technical Sessions Committee reported that V. De Naples will give a talk on Designing, Making and the Use of Racks for Hard Chrome Plating at our December 1st Business Meeting. Our next open meeting will be held Friday, December 15, 1944 at the Hotel Barnum at 6:30 P.M. with a Dutch treat dinner and Mr. Adolph Bregman as the speaker. Fred also mentioned that he is working on a new list of speakers for the balance of the fiscal year which will be printed and sent to the members as soon as possible.

Communications:

A letter from Executive Secretary E. T. Candee pertaining to information desired by the Bridgeport Branch was ordered to be placed on file.

A letter from F. K. Savage, Second Vice-President and Membership Chairman regarding new membership was turned over to H. M. Goldman, our membership chairman.

A letter from George J. Karl thanking the members of the Bridgeport Branch for the honor accorded him to the Honorary Membership.

A letter from the Community Chest and Council, Inc., Bridgeport, Conn. was ordered to be placed on file.

A letter from the Bridgeport Visiting Nurse Association, Inc., enclosing a $5.00 Christmas Seal Bond. A motion was made and passed to have the Secretary purchase this bond for the "Campaign Against Tuberculosis."

Applications for Membership:

Clarence Brown, 26 Anderson St., Stamford, Conn., Associate Member.

Balloting for Membership:

Harry Davidoff, General Electroplating Co., Stamford, Conn., Associate Member.

Unfinished Business:

No report to date on Permanent Regional Fund from A. J. Maz, President of the Waterbury Branch.

New Business:

A motion was made and passed to hold an Old Timer's Night in conjunction with a regular meeting. It is with our usual tradition that we hold such a meeting and President A. R. McNeil has appointed the following to serve as a committee for the Old Timer's Night to be held January 5, 1945, at the Hotel Barnum at 8:00 P.M. Food and refreshments will be served and the tickets are $1.50 each.

A. R. McNeil, Chairman; V. Consalvo, F. Gotthardt, S. Pochna.

President A. R. McNeil suggested that the members get together on the government sponsored course in Chemistry and Electrochemistry. We must have at least 15 members to start this course and anyone interested in this course and education should contact President McNeil or the secretary for information.

Bills against the Branch were ordered to be paid.

Good of the Order:

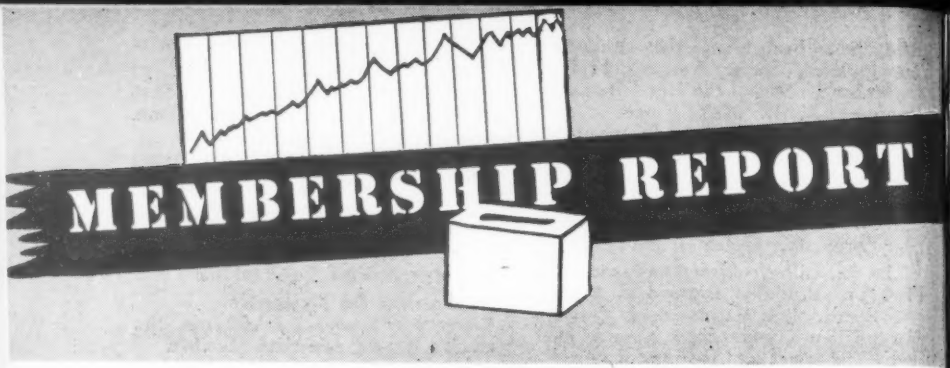
No comments at this time.

The Treasurer's report was read and accepted.

President A. R. McNeil turned the meeting over to Librarian F. B. Gotthardt. He called upon V. De Naples who spoke on "Designing, Making and the Use of Racks for Hard Chromium Plating." A discussion followed this fine talk which proved interesting and educational to all of the members present.

Meeting adjourned at 11:00 P.M.

JOSEPH G. STERLING, *Sec'y-Treas.*



FRANK K. SAVAGE
Chairman, Membership Committee

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J. Lavitas, 1658 Lawdale Ave., Chicago, Ill., Active

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Harry Pochapsky, 121 E. 233 St., Euclid 17, O., Associate
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Victor Turk, 6708 Schaefer Ave., Cleveland 3, O., Associate

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Robert Hungerford, 42 Rosedale St., West Hartford, Con., Associate
Frank Legas, Pape Electroplating, Inc., New Britain, Conn., Active
William Flint, American Hardware Co., Research & Testing Lab., New Britain, Conn., Associate
Hans Peterson, 4 Vernon St., Hartford, Conn., Active
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G. A. Wineburg, Active
Albert Walkerstorfer, 834 Thomas Ave., St. Paul, Minn., Associate
Edward Walkerstorfer, 1507 West Iowa, St. Paul, Minn., Active
Joseph Walkerstorfer, 1365 West Idaho, St. Paul, Minn., Associate

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REINSTATED

Boston Banch
George Heeney

CHANGE IN STATUS

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Thomas R. Gill from Associate to Active membership

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F. W. Schatz from Anderson Branch to Cleveland Branch
Wilson White from Anderson Branch to Indianapolis Branch
R. M. Wagner from Anderson Branch to Indianapolis Branch
G. A. Cheney from Anderson Branch to Indianapolis Branch
G. W. Whipple from Anderson Branch to Indianapolis Branch
D. A. Cotton from Anderson Branch to Indianapolis Branch
Charles Hauri from Anderson Branch to Indianapolis Branch
E. R. Unrah from Anderson Branch to Indianapolis Branch
M. M. Beckwith from Anderson Branch to Indianapolis Branch
E. L. McKinney from Anderson Branch to Indianapolis Branch
Fred L. Brower from Anderson Branch to Indianapolis Branch
Orville Stewart from Anderson Branch to Indianapolis Branch
Rex Oyler from Anderson Branch to Indianapolis Branch
Lyle Williams from Anderson Branch to Indianapolis Branch
Chester Wilson from Anderson Branch to Indianapolis Branch
Albert Strauss from Hartford Branch to Bridgeport Branch
J. A. Raskin from Detroit Branch to Chicago Branch

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Lucien Hinsch

Chicago Branch
G. M. Elliot

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John Varick

SUSPENSIONS

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Roy Phillips

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E. J. Deitzel
A. J. Domelle
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J. Griesman
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F. W. A. Kurt
F. J. Lelaun
C. W. Manz
H. F. Peuter
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P. A. Springer
V. E. Van Stone

DEATHS

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Morris R. Moody

Philadelphia Branch
Ernest Ohl

Providence-Attleboro Branch
William D. Hall

MEMBERSHIP CHART

BRANCH	May 1944	Change in Membership	Percent Change
FIRST GROUP			
CLEVELAND	115	+21	+18.2
LOS ANGELES	123	+17½	+14.2
HARTFORD	114	+13½	+11.8
DETROIT	336	+33	+ 9.8
PHILADELPHIA	138	+12	+ 8.8
NEW YORK	158	+12½	+ 7.9
BOSTON	130	+ 9	+ 6.9
WATERBURY	111	+ 7½	+ 6.7
CHICAGO	323	+14½	+ 4.4
NEWARK	198	+ 5	+ 2.5
ST. LOUIS	111	....	....
SECOND GROUP			
TORONTO	109	+11	+10.
DAYTON	100	+10	+10.
BALTIMORE-WASH.	107	+ 8	+ 7.4
NEW HAVEN	95	+ 7	+ 7.3
BRIDGEPORT	102	+ 7½	+ 7.3
GRAND RAPIDS	109	+ 6½	+ 5.9
SPRINGFIELD	79	+ 3	+ 3.2
ROCHESTER	83	+ 3	+ 3.2
BUFFALO	80	+ 2	+ 1.2
MILWAUKEE	97	....	....
THIRD GROUP			
INDIANAPOLIS	74	+31	+41.8
PROV.-ATTLEBORO	66	+25	+37.8
SYRACUSE	51	+12½	+24.5
TOLEDO	42	+10	+23.8
JACKSON-LANSING	51	+11	+21.5
PITTSBURGH	68	+ 4½	+ 6.6
LANCASTER	40	+ 2½	+ 6.2
CINCINNATI	63	+ 2	+ 3.1
SAN FRANCISCO	39	+ 1	+ 2.5
MONTREAL	50	+ 1	+ 2.
AUSTRALIA	51	....	....
TWIN CITY	39	....	....

Membership May 1, 1944 = 3385
Membership Jan. 1, 1945 = 3728

Gain in Membership = 343
Per Cent of Gain 10.1%

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The war is still on . . . and will be for some time to come.

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What's even more important—don't cash in those War Bonds before they mature. Stick them away in a safe place—and forget about them till you can reap the full harvest on them.

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1—4000/2000 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY** "INTERPOLE" DESIGN Motor Generator Set. Separately Excited. Complete Control Equipment.
1—3000/1500 AMPERE, 8/16 VOLT **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. (Practically new.) "INTERPOLE" DESIGN. Separately Excited by Motor Generator Set. Complete Control Equipment.
1—3000/1500 AMPERE, 5/10 VOLT, **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. Separately Excited. Full Control Equipment.
1—3000/1500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC COMPANY** Motor Generator Set. Separately Excited. Full Control Equipment. Excellent Condition.
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1—1500 AMPERE, 6 VOLT, **HANSON & VAN WINKLE CO.** "INTERPOLE" CONSTRUCTION Motor Generator Set. Double Commutator Design. (Can be operated at 1500 Amperes, 12 Volts.) Separately Excited. Full Control Equipment.
1—1500/750 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE CO.** Motor Generator Set. Self-Excited. Full Control Equipment.
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1—1000 AMPERE, 6 VOLT, **BENNETT & O'CONNELL ELECTRIC CO.** Motor Generator Set. Excellent Condition. Full Control Equipment. Double Commutators.
1—1000 AMPERE, 8 VOLT, **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. Excellent Condition. Full Control Equipment.
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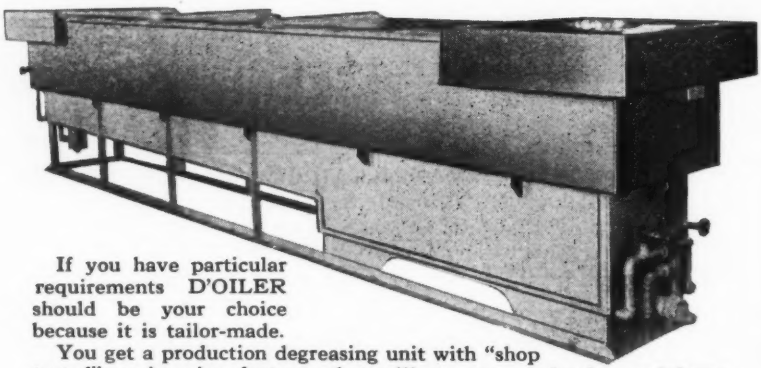

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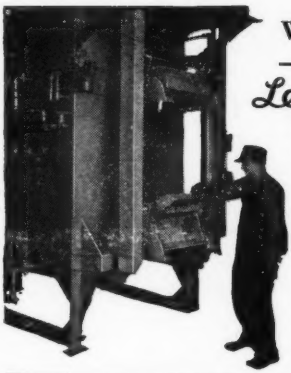

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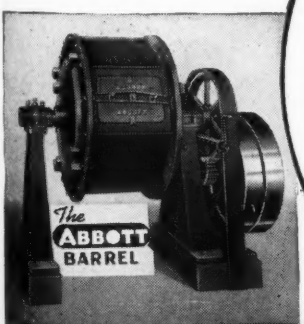

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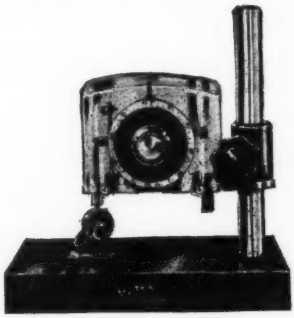

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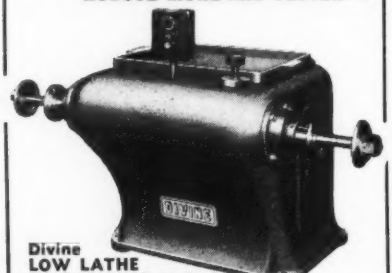

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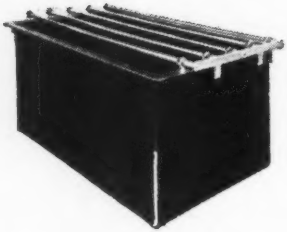

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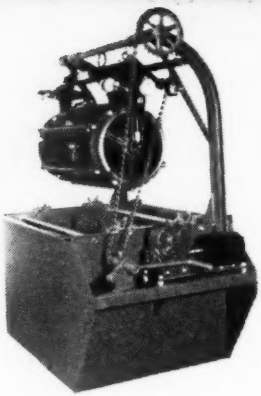

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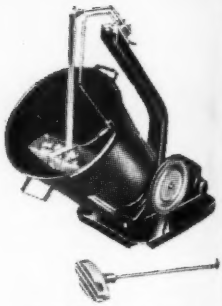

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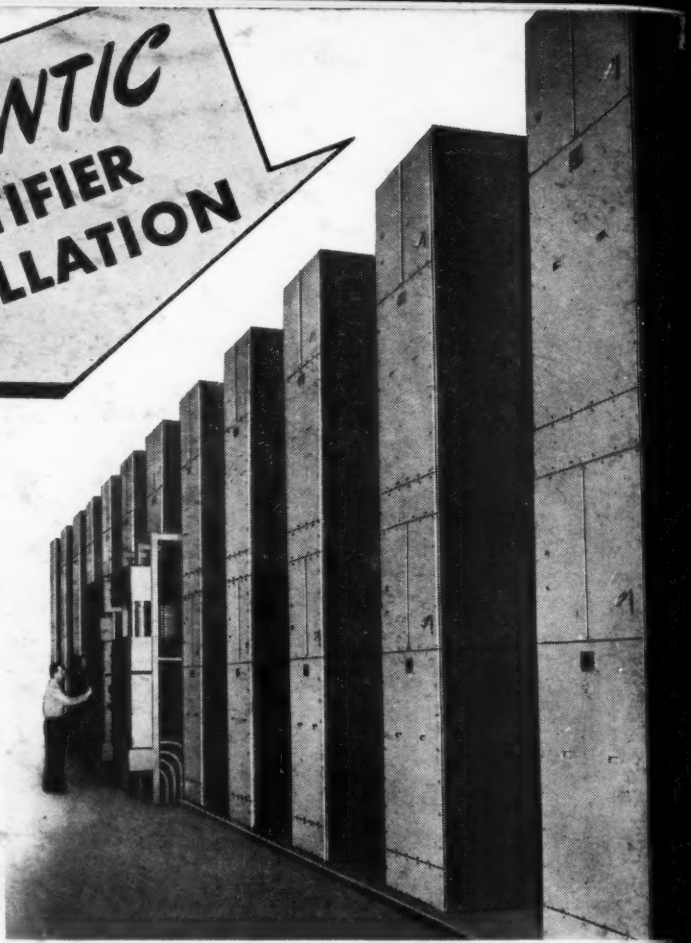

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